Electrical Review

WITH WHICH IS CONSOLIDATED WESTERN ELECTRICIAN AND ELECTROCRAFT.

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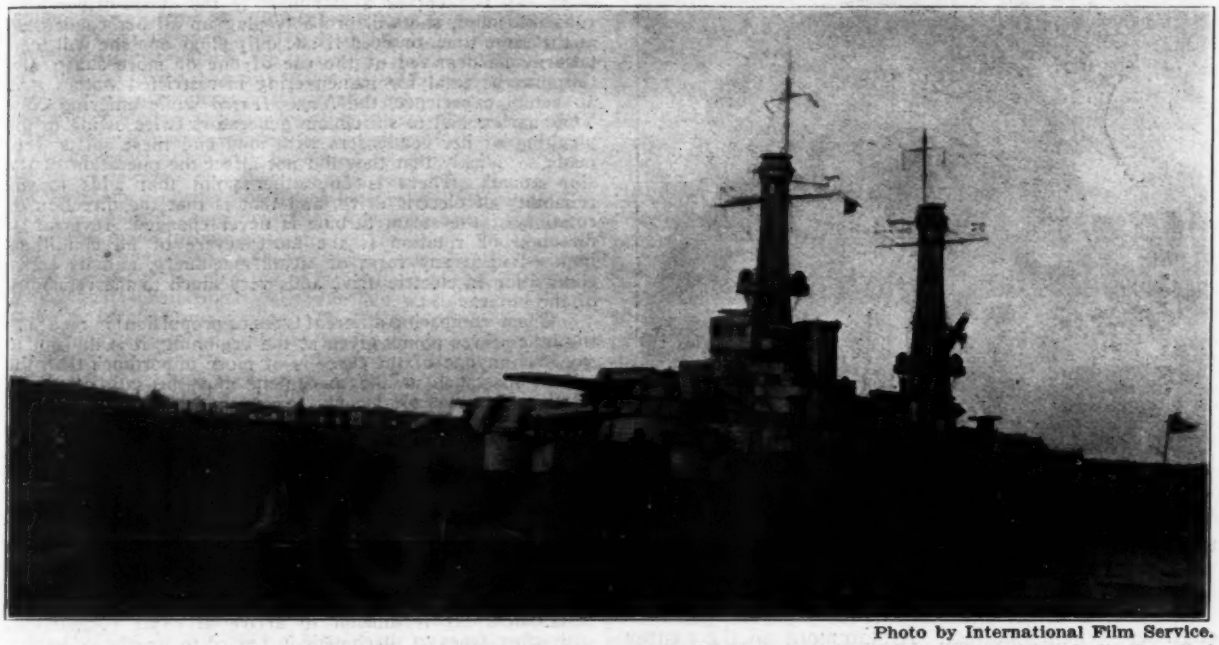

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United States Battleship New Mexico—The Most Powerful Capital Ship Afloat in Any Navy of the World—Electrically Propelled by the Unique Equipment Described Below.

Electric Propulsion as Developed on Battleship New Mexico

Description of Electrical Features of Propelling Equipment of Most Powerful Dreadnought Afloat, Especially the Two Turbine-Generators and Four Induction Motors Direct-Connected to Propellers

SHIP propulsion by electrical means has made steady progress for several years and has reached the highest stage of development yet attained in the new 32,000-ton United States Battleship *New Mexico*, the tests of which yielded rather remarkable results. Speaking on the tests of this most powerful battleship now afloat, Secretary of the Navy Daniels said recently before a congressional committee:

I recently paid a visit to the battleship *New Mexico*, which is the latest dreadnought to join the fleet and the first and only one of any nation to have electrically operated propelling machinery. On this account she has been an object of surpassing interest to the officers of our own navy and to those of foreign navies as well, and to electrical engineers in general.

The result was satisfactory from every point of view and confirmed the judgment of all who were in any way concerned in its design and adoption. There was not the slightest mishap with any part of it, everything worked to perfection, and the crew was as enthusiastic over the performance of the machinery as is the department proud in the possession of such an efficient dreadnought.

The machinery was designed to develop 26,500 hp. at full speed, which it was expected would give the ship a speed of 21 knots. She actually developed more than 31,000 hp. and maintained for four hours a speed of 21¼ knots, and this when running at a displacement 1000 tons greater than her design called for. If she had been tried at her designed displacement, as is customary with all new ships, she would have made 21½ knots without any trouble whatever, and what is still better, she could have kept up this speed as long as her fuel lasted, for like all our later dreadnoughts, she is an oil-burner and there would be no reduction in speed due to the necessity of cleaning fires, which must be done in coal-burning ships after a run of four hours at top speed.

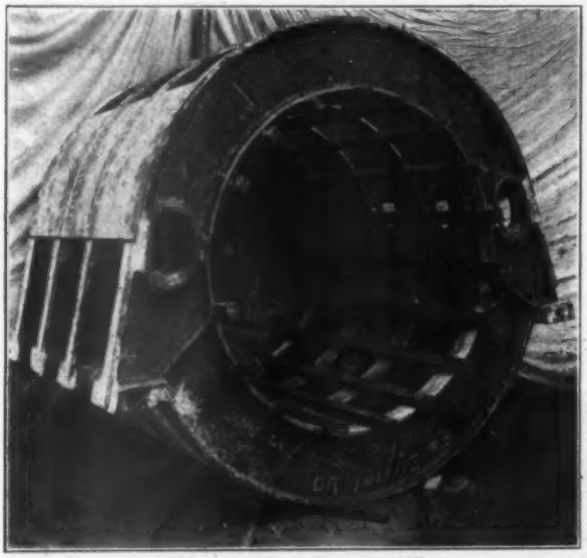
When we entered into contract for the machinery of the *New Mexico*, we stipulated that, in addition to being capable of developing the maximum power, she should also give an economy at cruising speed very much superior to that obtainable with the turbine installations that we had previously used, and I am happy to say that this stringent requirement was also met. As a matter of fact, the *New Mexico* will steam at 10 knots on about 25% less fuel than the best turbine-driven ship that preceded her.

On the whole, I think the country has cause to be proud of this achievement in engineering, not alone because of the

pronounced success in this particular instance, but because of the assurance it gives us of the superiority of our capital ships to those of foreign nations.

Electric Drive from the Naval Standpoint.

Electric ship propulsion finds its greatest advantages in the case of large warships and consequently has been developed most in this type of vessel. It is interesting therefore to know the opinion of naval



Sectionalized I-Beam Type of Generator Frame—This Light-Weight but Strong Construction Is Used for the New Mexico's Main Turbogenerators.

engineers on this subject. A statement on the matter has just been made by Commander S. M. Robinson, of the Bureau of Steam Engineering, United States Navy Department, who says:

Any type of propelling machinery, to be acceptable for a capital ship, must be entirely satisfactory in the following particulars:

(1) Reliability.
(2) Weight and space occupied.
(3) Economy.
(4) Flexibility of installation.

Needless to say, the most important of these is reliability; and no machinery should be considered at all which has not proved itself satisfactory in this respect. The performance of the *Jupiter* during the past five years has thoroughly proved the reliability of electric machinery on board ship. For demonstrating this quality, the *Jupiter* was a good type of ship to select, as a collier ordinarily does a great deal more cruising than a capital ship. During the past five years the *Jupiter* has been held up only once on account of trouble with her electric equipment, and in this case the delay was for only two or three hours and the repairs were effected by the ship's force with the facilities available on board ship.

The trials of the *New Mexico*, just completed, indicate that she should duplicate the performance of the *Jupiter* in this respect. In fact, there are inherent reasons why electric propelling equipment is more reliable than any other types of machinery. As direct-connected or geared turbines are usually arranged, it is seldom the case that damage to one turbine does not affect more than one shaft; with electric machinery, each shaft can be absolutely isolated from the others by merely opening a disconnecting switch to the motor on that shaft. Furthermore, in case of damage to a turbine with the straight steam drive, the ship is left to drag one or more propellers while driving with the others; with electric drive, the failure of one turbine will still allow the ship to be propelled by all four screws in a perfectly normal manner. The latter will be seen to be no small advantage when it is considered that the effect of one dragging screw may be as high as 15% of the total effective horsepower required to drive the ship, and to this may be added the fact that the maneuvering qualities of the ship are not nearly so good when it becomes necessary to drag one screw. It sometimes happens that the damage to a turbine is such that the shaft cannot be allowed to revolve; in this case, it becomes necessary to limit the speed of the ship as the "jacking gear," or other locking devices, is not sufficiently strong to hold the shaft at high speeds of the ship.

There is still another advantage of electric propulsion that is brought out very strongly when the ship is maneuvering in shallow or muddy water, such as obtains in harbors and their entrances; the ordinary ship uses all of her main engines and therefore all of her main condensers and auxiliaries all the time, but an electrically driven ship need use only one turbine, condenser, and set of auxiliaries and the other can be kept as a standby. If the steam-driven ship runs into mud, she will probably plug up all her condensers at the same time, or even if she only plugs one she will temporarily be deprived of the use of one or more shafts and this may be fatal for maneuvering in restricted waters. As an actual experience, the *New Mexico* while entering New York harbor had to shift main generators twice owing to the plugging of her condensers with mud and these shifts were made so quickly that they did not affect the operation of the ship at all. There is one other point that adds to the reliability of electric drive, and that is that the direction of rotation of the steam turbine is never changed; reversal of direction of rotation is the most severe of all conditions imposed upon any form of steam machinery, and its entire elimination in electric drive adds very much to the reliability of the latter.

When comparing different types of propulsion in regard to the other three points given at the beginning, it is difficult to say that anyone of the three is of more importance than the others, inasmuch as the machinery must be satisfactory in all three respects; it is only where two types of machinery are nearly equally satisfactory in some of these respects that they can be directly compared in regard to the remaining points. For example, no type of machinery could be considered which was vastly heavier or occupied twice the space of the other types of machinery, no matter how economical it might be, and, *vice versa*, the economy must be reasonably good or any question of weight saving could not be considered. Therefore, the electric drive will first be compared with other types of machinery in these two respects before proceeding to a consideration of its relative advantage as to installation. It is difficult to arrive at exact comparisons with other types of machinery in regard to weight as, so far, we have built no capital ship with geared turbines arranged on four shafts and therefore are unable to get a direct comparison of the two types of machinery; but, from the data at hand, it is not believed that there is any very great or important difference between the electric drive and geared turbines in regard to weight, although it seems to be fairly certain that the geared turbine has a slight advantage in this respect. In regard to the question of floor space occupied, it is not believed there is any great difference, and what difference there is is probably in favor of the electric drive. It is at least safe to say that so far as weight and space occupied are concerned, the difference is not great enough to be of much importance.

As to the relative economy of electric and geared drives, we are able to make a little more definite statement than in the case of the weight comparisons. It seems fairly certain that in the case of large horsepower installations with large speed reductions, such as are found on battleships and battle cruisers, the geared turbine will have a slight advantage at full power, but at the lower speeds of the ship the electric drive will have a very material advantage over the geared installation. Just how great this advantage will be will depend to some extent upon the arrangement of the machinery. For example, on a battle cruiser developing enormous horsepower at full speed, and where it would be necessary to use all of this transmission gearing at the cruising speeds of the ship, the saving by the use of electric drive would be very much greater than in the case of a battleship where the percentage of reduction of power would not be so great.

In connection with the subject of economy, it is interesting to compare the trial results of the *Pennsylvania* and the *New Mexico*. The *Pennsylvania* is fitted with direct-connected turbines and small geared cruising turbines which can be run up to speeds slightly above 15 knots. The trial results of the two vessels show that in total fuel consumption the *New Mexico* saves more than 20% over the *Pennsylvania* at speeds from 19 knots to full power. At a speed of about 15 knots, which is about the limit of the geared cruising turbine and also of the low-speed connection of the electric drive, there is a very much greater saving, it being something in the neighborhood of 30%. At 10 knots, the fuel saving is apparently very small, although at both 10 and 15 knots the trial results were not directly comparable

on account of the different conditions under which the trials of the two ships were run. Ships fitted with small geared cruising turbines, however, showed remarkably good economy at very low speeds of the ship, such as 10 knots.

It therefore appears that electric drive, generally speaking, is quite satisfactory in regard to points (1), (2), and (3), and compares very favorably with other types of propulsion in these respects. It may, therefore, be compared directly with other types of machinery in regard to point (4), the "flexibility of installation." The tendency in building modern capital ships is to provide for more and more torpedo protection and it becomes necessary to crowd the machinery away from the sides of the ship as much as possible. This arrangement is also desirable from the point of protection against gunfire for a similar reason. In this respect, electric drive has an enormous advantage over any other type of machinery in which the prime mover is mechanically connected to the propelling shaft. The main turbine-generators may be placed in any part of the ship that is most desirable; they may be placed in compartments forward of each other and they may be raised up enough to place the main condenser underneath them—in fact, there is practically no limit, other than the head room, as to the position of the main turbine-generator in the ship. This gives an enormous advantage to electric drive over all other types of machinery and enables the naval constructor to give far more adequate protection to the ship and machinery against damage by torpedo and gunfire. Those parts of the machinery—the main motors—which is necessary to connect mechanically to the shafts, are comparatively small and take up only a small space so that they can be placed in small isolated compartments which will not menace the ship in case of flooding; since no main auxiliaries are required for the motors, the flooding of a motor room will not entail any loss in that respect. Also, the motors may be placed very much farther aft than can steam-driven turbines and therefore the length of the main shafting can be very materially reduced. This constitutes a big advantage; both on account of less liability to derangement of the shafting itself, due to injury to the ship, and also of less danger to the ship itself because of the shafting not having to pierce a number of water-tight bulkheads. Utilizing these advantages to the fullest extent makes it possible to build capital ships which are far superior to any others fitted with any other form of machinery. In addition to advantages from the point of view of protection, there are also the advantages from an engineering standpoint. The shorter lengths of shafting make it easier to keep the shafts in line; the grouping of boilers around the machinery makes short and direct steam pipes with a consequent reduction in weight.

General Features of the New Mexico Installation.

The electric propulsion equipment of the *New Mexico* consists of two main turbine-generator units, condensing type; four main propelling motors; two sets of motor-driven condenser auxiliaries, including circulating pumps, air pumps and hot-well pumps; two turbine-driven exciters for the generators and two motor-driven boosters auxiliary thereto; four motor-driven lubricating-oil pumps and two motor-driven oil coolers and tanks; several motor-driven blowers for ventilating the main generators and motors; complete switching controlling and instrument equipment for the complete outfit. The turbines and all of the electrical equipment mentioned above were furnished by the General Electric Co. The following facts regarding the principal features of the equipment are extracted from descriptions by Eskil Berg, C. S. Raymond and A. D. Badgley, of the engineering departments of the manufacturer:

Each of the two main turbines is connected to a quarter-phase generator having two poles. The four propelling motors are wound in such a manner that by suitable changes of connections, effected through groups of oil switches on the control board, the windings can be arranged either for 24 or 36 poles. The ratio of speed reduction, therefore, between the turbine and propeller is approximately 18:1 to 1:1.

The 36-pole connection is used for all low-speed running up to a maximum speed of about 15 knots. Above that speed the 24-pole connection is used. All reversing is done with the motors connected for 36 poles.

Each turbine is equipped with a special governor so designed that, by movement of a fulcrum connected to it, the speed can be held at any desired point within the range desired. The movement of this fulcrum is accomplished by a mechanical connection from a control lever on the operating board.

For all conditions of steady running up to about 15 knots only one turbine-generator is used with its required auxiliaries, and all of the motors are connected for 36 poles, giving a speed ratio of 18:1. If a higher speed is required, the pole connections are changed from 36 to 24, giving a speed ratio of 12:1, and a speed of about 17 knots can thus be obtained when only one generating unit is used to drive the ship. The windings of the generator can be connected in multiple by means of a switch, so as to reduce the voltage, which increases the current capacity of the generator and also gives increased torque and better efficiency. Above that speed and up to the maximum speed of the ship, the second generating unit is in service. With this arrangement each generator operates a pair of motors, and the two circuits are entirely separate from each other. When both generating units are used, the windings of each generator are connected in series by a switch so as to give the desired higher voltage for maximum speed.

The ship can be started with either one or both generating units, and with the motors connected for either 36 or 24 poles. When both generating units are used for steady running, the motors are always connected for 24 poles for economical reasons.

All switching, pole-changing, etc., is done on a dead circuit. The switches are, however, designed so that they can be operated under full-load condi-

Highest Type of Rotor Development Developed for High-Speed Turbogenerators—Type of Construction Used for New Mexico's Propulsion Generators.

tions, should an emergency require such operation. Interlocks are provided by which it is impossible to move any of the switches without having first interrupted the field circuit of the generator and allowing the line current to die down to a predetermined low value. This reduction of current enables the switching to be done smoothly and with minimum electrical and mechanical stress in the electrical circuits.

Two 300-kw. turbine-gear-driven, direct-current generating sets, arranged for either 120 or 240 volts, supply the excitation and power for the auxiliaries mentioned above. There are also two motor-driven boosters supplied, one for each generator field. These boosters can either boost or lower the voltage 60 volts; in other words, if the field is connected to the 240-volt circuit the excitation voltage can be varied from 180 to 300 volts, and if on the 120-volt circuit from 60 to 180 volts.

In order to obtain quick reversal, increased field excitation is always used and can be obtained only by pulling the field lever by hand against a heavy spring which brings the excitation back the instant the lever is released. By this arrangement, injurious heating of the field is prevented.

When operating at full load and approximately 2000 r.p.m., each generator requires 38,000 cu. ft. of ventilating air per minute. The fans at each end of the rotor will provide this quantity, but on account of the resistance of the air ducts between the deck and the generator, it was desirable that these fans be supplemented by separately driven blowers. Therefore each generator is provided with two fans, each of which is capable of delivering 20,000 cu. ft. of air per min. when operating at a speed of 380 r.p.m. Under these conditions, each blower requires an input of about 17 hp. These blowers are installed in a room directly above the generators. They receive the air from the deck and force it through ducts into large enclosed compartments directly under the generators. After passing through the generator, the air is discharged from the top and carried upward to the deck. In addition to the four 20,000-cu. ft. per min. air blowers, there are two similar blowers used to supply air to the center engine room in which are located the two motors driving the inboard propellers as well as all of the engine-room auxiliaries and propulsion control apparatus.

One of the Propulsion Motors for the Battleship California—Similar Motors Are Being Built for the Maryland and West Virginia—The New Mexico Motors Are Similar in Appearance, but the Frame Is Somewhat Longer and There Is No Contactor on the End Shield.

Under the most severe conditions of operation, each main motor requires 20,000 cu. ft. of air per min. and the blower action of the rotating element must be supplemented by separately driven blowers. In the case of the motors, the blowers are placed in the outgoing ducts of the motors. Each motor has two blowers, each passing 10,000 cu. ft. of air per min. at a static pressure of about 1.9 in. of water. These blowers are driven by 8.5-hp. direct-current motors at a speed of 510 r.p.m.

One of the advantages of using separately driven blowers as part of the ventilating equipment is that the quantity of air is not so seriously impaired when the motors or generators are operating at low speeds, but at relatively high loads.

Respecting the operation of the equipment Mr. Berg says: "The propelling machinery of the *New Mexico*, although entirely new and different from the types of machinery which the officers and men were previously accustomed to handle, has functioned perfectly from the first day the vessel was put into commission. During all the breaking-in periods of the various shifts of engine-room crews, there was never a mishap to any of the electrical propelling machinery; and the men handled all the apparatus with perfect confidence after only a few hours of training."

Some Details of the Main Generators.

The *New Mexico* is equipped with two main turbine-generator units, each generator designed to develop 10,500 kw. at 78% power-factor, and 13,500 kv-a. at full speed of the ship, and to carry a 25% overload (16,850 kv-a. at 78% power-factor) for four hours. The rotors have two poles and a maximum rotative speed of 2100 r.p.m. which corresponds to a frequency of 35 cycles. The stators are wound two-phase with leads brought out from the beginnings and endings of each phase to an 8-pole, double-throw, disconnecting switch placed in the main circuit between the generators and the motors. By manipulating this switch two generator connections are available: first, diametrical, two-circuit, low-voltage—(3000 volts); and, second, square, one-circuit, high-voltage—(4240 volts). With a constant flux, the voltage will vary directly or inversely as the $\sqrt{2}$, depending on the connection involved. Suitable interlocks have been installed, making it impossible to operate the two generators in parallel.

Generator efficiency curve, taken at loads and speeds corresponding to 10, 15, 19, and 21 knots, shows a uniformly good efficiency throughout a wide range of load. It is based on actual running conditions, and includes the windage loss of the rotor. The main turbine-generators are used only for propelling the ship, and are in no way connected to the lighting or other auxiliary power circuits. Therefore, it is possible under the varying conditions of load to adjust the voltage and current to obtain good efficiency.

The speed reduction between the generators and the motors when using the 24-pole motor connection is 12 to 1, and with the 36-pole connection, 18 to 1. Hence, the extreme range of generator r.p.m. for the specified operating speeds of the ship, 10 to 21 knots is approximately 1440 r.p.m. to 2100 r.p.m. In order to calculate the generator efficiency with accuracy, the windage loss must be carefully determined at various speeds for this is the largest single loss.

The generators are conservatively designed. Compared with the maximum rated machines for land practice, the relative armature reaction is considerably lower and the densities in the magnetic section are slightly higher. Sufficient excitation current is applied to the generator fields to insure keeping the motors and generators in step. In other words, the generators are not working at the peak of the kilowatt curve, but at a safe distance down where there is sufficient margin in power to take care of the rudder swings and heavy seas. Based on the maximum power-factor of the motors, 79%, the generators have a margin in power of 24% with the excitation given.

The mechanical design of the generator is similar to that of other machines developed for central power stations. One feature that differs from land practice is the omission of the turbine and generator base castings. The turbine casing, generator stator frame, and bearing standards are bolted directly to a stiff structural steel foundation which is securely tied in with the ship's structure.

The stator or armature is of a compact design. The stator frame is of the sectionalized I-beam type which consists of several circular I-section castings, properly spaced and held together at their outer periphery by boiler plates, these plates being hot-riveted to the I-section castings. The I-section castings after being properly spaced and supported are carefully bored out at their inner periphery for the attachment of rectangular steel bars, these bars forming the dovetail ribs for assembling the stator core punchings.

The stator coils are of the conventional barrel type, two coil sides in each slot. The conductors consist of insulated rectangular wires which were formed into the proper shape in a bending form.

The electrical and mechanical limits of turbine-generators are encountered in the design of the rotor or field. The electrical limits are confined to the heating of the field windings and the mechanical limits to the centrifugal strains and to the critical speed.

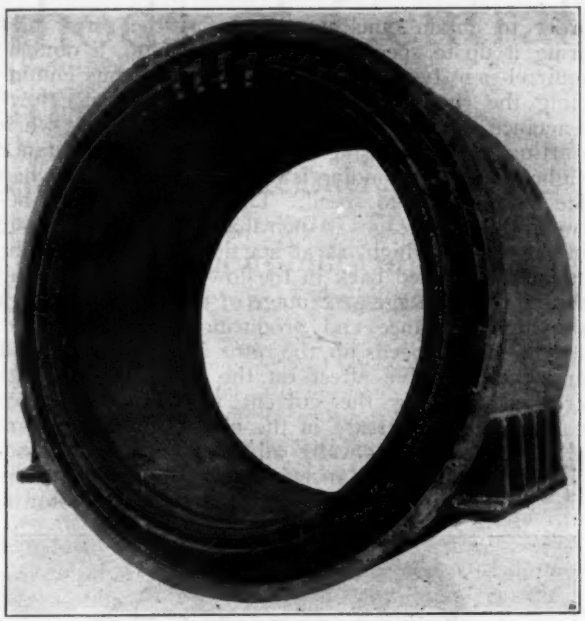
Radial slots for the rotor windings were machined in the solid forging. The rotor coils are made of rectangular copper strip wound on edge by a machine, which forms the corners of the coils and varies the span of each turn the correct amount.

The slot insulation consists of mica and asbestos sheets placed between horn fiber for mechanical protection in assembling the turns. This insulation is a continuous sheet and extends the entire length of the slots. After assembling, the coils were heated by electric current, cemented, and pressed into their proper position, under a pressure exceeding that to which they are subjected in operation.

The portion of the coils outside the rotor body is insulated with mica tape. Over the mica tape is a layer of asbestos tape which serves as a mechanical support and protection to the mica. In the slots the insulation was lapped over the coils, cemented, the necessary filling strip inserted, and steel wedges driven in to retain the coils in the slots. The end coils are carefully supported by moistureproof blocks to prevent any movement. To protect the ends of the coils from moisture, several layers of insulating varnish are applied and each layer baked until dry.

Some Facts Regarding the Propelling Motors.

In the *New Mexico* the highest possible economy was desired at the two most important speeds: high speed with full power at 21 knots, and medium speed at 15 knots where the maximum cruising radius without refueling is of the greatest importance. With



Double-Squirrel-Cage Induction-Motor Rotor for Battleship Propulsion—Ratio of Diameter to Length of Rotor Is 2:1; in Land Type of Machine It Would Be 4½:1.

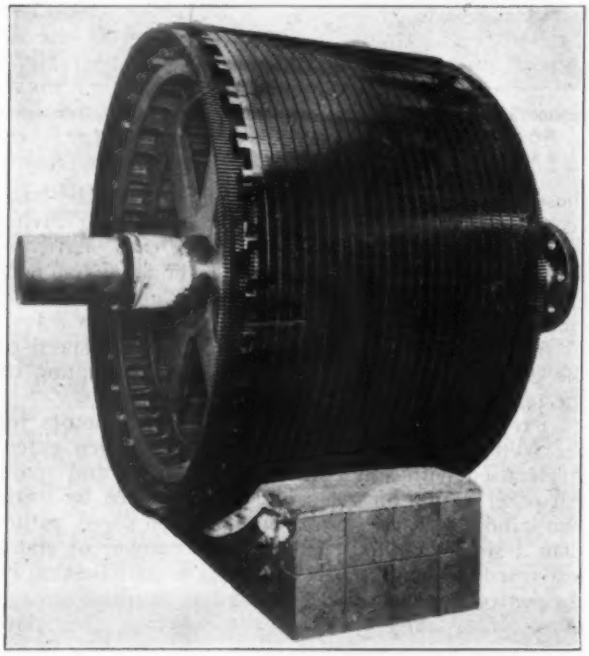
these requirements, it was evident that for the most economical operation a changeable-pole motor giving a speed ratio of 2:3 was desirable on each shaft, the four motors at full speed taking power from two generators and when cruising from one generator. By changing the poles on the motor, the proper speeds of the screw are obtained with a maximum speed of the generator thus giving low steam consumption on the turbine in both cases.

Previous to the time of designing the motors for the *New Mexico*, a 2:1 speed ratio had been extensively used with single windings in stator and rotor. All other ratios of speed had been secured by using two windings in the stator, one for each speed, rather than a single winding with a large number of stator leads, which would cause too great a complication of the control. The double winding has the disadvantage of requiring a larger motor, as only half of the copper is in active use at either speed.

Since the motors and generators of the *New Mexico* were to be especially built to operate together, more liberty in design was allowed. A new type of winding was designed, the coils of which were so grouped that a change in the connection at the motor terminals would give a balanced quarter-phase distribution for either 24 or 36 poles. This gives a simpler control than if the motor were wound three-phase. In addition, since the four motors receive power from two generators at full speed and one generator at cruising speed, the best combined operation is obtained with a decreased voltage on the 36-pole combination. This also works out best for a quarter-phase winding; by connecting the generators in square connection for high speed and parallel connection for low speed, the correct ratio of operating voltage is obtained. By this scheme of connection, eight terminals were brought out of the motor though only four-line leads were required.

The torque requirements derived from actual experiments on the *Jupiter*, supplemented by tank trials, showed that a resistance inserted in the rotor winding would be required only for a few seconds at a time, that is during starting or upon reversal in

order to obtain quick possession of the screw and bring it up to speed. With this in mind, a double-squirrel-cage type of motor was adopted thus eliminating the rheostat. The outer high-resistance low-reactance winding takes the place of the rheostat when starting and reversing. The inner low-resistance higher-reactance winding is the running winding when the motor is up to speed. The inductive action between these two cages is such that when the frequency in the rotor is high, as at starting or reversing, the current is choked back in the low-resistance winding thus forcing a large percentage of the current through the high-resistance and producing adequate torque. As the motor speeds up, the rotor frequency drops off and the inductive effect on the inner winding decreases, allowing the current to increase with a corresponding decrease in the outer winding until at slip frequency practically all of the current passes through the low-resistance cage. By this construction, the torque advantage of a high-resistance rotor is



Completely Wound Stator of Propulsion Motor Whose Rotor Is Shown in the Preceding View.

obtained with the low slip and high efficiency of the low-resistance type of rotor when at full speed.

In addition to reducing the size by designing a lower power-factor machine and using all the active material at both speeds, a minimum of weight with ample strength was obtained by the use of steel throughout for the mechanical structure. The stator frame was made up of a series of circular rings of I-beam section with dovetail ribs attached. Each ring is of sufficient strength to support its section of punchings, and is held in position by being riveted to rigid steel feet. Boiler plate extending the full length of the frame was rolled to fit the I-beams and was securely riveted to them, making a very rigid and compact structure. By increasing the number of circular sections any length of frame desired can be made up. Holes for ventilation purposes were cut in the top half of the frame through the boiler plate. In this framework, the stator punchings were assembled on dovetail ribs and clamped with steel finger flanges held in place by bolts and studs.

The stator winding was made of form-wound coils of rectangular wire carefully molded and insulated principally with mica and with a special varnish treatment to prevent damage due to moisture or salt accumulation on the windings. This insulation is capable of withstanding a higher temperature in the core than is usual for induction motors.

The double-squirrel-cage secondary winding consists of two entirely separate cages, the bars in both cases being driven into close fitting slots without insulation, allowing the heat generated in these windings to flow freely by conduction into the rotor iron.

The outer cage is of high-resistance metal short-circuited by copper end-rings into which the bars are brazed. This ring also is in intimate contact with the rotor punchings. Thus, during reversal when the greatest amount of heat is generated in this winding, the heat storage of the rotor iron is taken advantage of and temperature of the bars kept down to a very conservative value.

The end ring is of special design made up of short sections connected together by expansion joints of laminated copper, thus allowing expansion due to heating being taken up between sections around the periphery and limiting the possible bending effect on the bars to a few mils instead of the comparatively large value which would exist if the ring were made solid and the diameter allowed to change.

The inner cage is of copper electrically welded to a copper short-circuiting ring made of a single piece of bar copper rolled in circular form to accurate size and the two ends welded together. It was not necessary to break up this ring as the inner winding was designed to remain cool under all conditions of running load, the only condition under which the double-squirrel-cage design allows full current is this winding.

Over the top half of the motor frame is fastened a hood connected to the ventilating ducts. Two fans are mounted in the hood driven by direct-current motors which draw air up through the motor.

The specified requirements for driving the *New Mexico* propellers called for 26,500 hp. at 161 r.p.m. corresponding to 21 knots ship speed, and 8350 hp. at 112 r.p.m. for cruising at 15 knots.

The motors were wound to operate with an output of 6700 hp. at 4000 volts on the 24-pole connection and 2050 hp. at 2800 volts on the 36-pole connection with an overload capacity of 8375 hp. at 173 r.p.m.

The official trials on the driving equipment of the *New Mexico* were made Dec. 16-18, 1918. Runs were made at various speeds from 7.32 knots to 21.31 knots to establish points for the standardization curve.

It developed that due principally to over-loading, which increased the displacement by over 1000 tons, the power required to drive was 29,100 hp. at 161 r.p.m. instead of 26,500 hp. at a screw speed of 166.5 r.p.m.

A four-hour endurance run under full power at 21.25 knots, requiring 31,000 hp. at 170 revolutions of the propeller was made, followed by runs at 19, 15 and 10 knots.

Two runs over the course were very interesting. The two inboard propellers were run from one generator with the motors connected 24 poles with the outboard motors disconnected, allowing the propellers to run free. Another trial was made with the outboard motors driving and the inboard propellers free. In both cases a little over 15 knots speed was obtained. These two trials showed that to drive the boat at the same speed, the inboard propellers required 11% more power than the outboard.

Merchandising Methods of Central Stations

Analysis of Selling Methods—Why Central Stations Are Interested in Merchandizing—Central Station Merchandising—Co-operation Between Utility and Contractor-Dealer and the Responsibility of One Toward the Other—Paper Before Minnesota Electrical Association

By W. S. HEALD

Duluth Edison Electric Company.

MERCHANDISING by a central station is purely a means to obtain a definite desired result. If the desired result is being obtained, then the method and policy of merchandising pursued is correct. If the desired results are not being obtained, there is something wrong with the method and policy of the merchandising and they should therefore be changed, because they are defeating the very purpose for which the merchandising is being done. Method and policy are only secondary considerations; the desired results being the all-important item.

Like most other problems, it can best be solved by first analyzing it to obtain the facts of the case, and if the analysis is correct and based on sound principles, it should lead to a correct solution. In collecting our data, it should be kept in mind that the average condition which covers the majority of central stations must be considered. Special cases in certain communities must be solved according to the merits of their individual conditions. Also in considering the sale of appliances, too often only the selling end is considered. The sale of appliances is only a part of the whole central-station business and is so vitally affected by its relation to the other parts of business that a broad viewpoint of the situation must be taken and other things of vital importance generally overlooked considered along with the subject "sale of appliances." Let us therefore make an analysis in order to obtain the facts.

The Central Station and Merchandising.

The central station is in business to make money. The most money will be made when the investment is used to the full limit of its capacity the entire 24 hours a day equally every day in the year. The standard by which this is measured is called load-factor. In most central stations, the residence load is the main factor contributing to destroy the above ideal load condition. The reason for this is due to the fact that most of the current used in the residence is for lighting and the habits of people are such that all have to use the current at the same time for only a few hours and very little at other times. Just at the time that the residence consumer needs and uses the light, also the business district demands its heaviest load, and the ratio of the maximum load to the average load is additionally increased, thus destroying the ideal conditions of operation which produce the most net revenue. If the residence consumer can be induced, therefore, to use current-consuming devices that will not be used during the time lighting is needed, the load will be corrected towards the ideal condition.

The nature of the load that the residence consumer should be induced to use having been determined, the next step is to examine the field of devices now on the market and pick out those whose use produces the above desired results. Experience and a study of the habits of people show that such household electrical appliances as the flatiron, toaster, percolator, grill, washing machine, ironer, vacuum cleaner, dish washer, etc., are used almost without exception at a time other than when the lights are used. It is therefore advisable to adopt a policy that will put these appliances on the lines and keep them in use. The central station has no choice in the matter, for during these days when the margin of profit is so very small, the variation of the load-factor one way or the other may determine a profit or a loss. The very existence of the central station is at stake and it must necessarily build up its residence load-factor.

The above facts have been brought out for the benefit of the electrical dealer so that he may understand the central station's problem more clearly. Therefore, before the dealer passes snap judgment upon the central station in his territory and criticizes its method and policy, he should put himself in the place of the central station, keeping in mind that his very existence depends upon successfully getting residence customers to purchase and use the electrical appliances.

Central-Station Merchandising Policy.

The method of bringing about the desired result having been determined, the next step is to work out the central-station policy that will be best. In studying out the policy, sight should not be lost of the fact that it consists of two parts. First, getting the consumer to purchase the appliances and, second, to keep him using them. If these two points are examined from the consumer's standpoint and properly analyzed, the analysis should direct us to a proper policy.

Do not forget the fact that the consumer has been getting along without the appliance by using other means. He, therefore, will not buy unless the convenience is worth the cost of operation. Therefore, the rates charged by the central station for residence business should be carefully considered. If the rates are prohibitive, the sale of appliances will never amount to much and the outcome of those that are sold tends to discredit electrical appliances in general, due to unreasonable bills. Current will only be used for lighting purposes and the rate in itself will defeat the purpose for which appliances are trying to be sold. A proper schedule of rates should have the following features:

1. Minimum charge should be high enough to cover cost of always being ready to give good service, not too high to

make a large percentage of the community non-users, and be expressed in such a manner as to not convey the idea that the consumer has to pay for something for which he gets no return.

2. The rate per kilowatt-hour should be worked out so as to stimulate a large volume of business, arranged so that the more that is used, the cheaper the rate per kilowatt-hour. Also the small demand customer should have the privilege of earning the lower rate as well as the higher demand customer.

3. The rate should be arranged so that a single meter can be used, thus eliminating the expense and delay of putting in special wiring to gain the benefit of lower rates.

4. The rate as a whole should be designed to bring profits from a large volume of business at a small profit per unit rather than from a small volume of business at a large profit per unit.

People will not trade with a firm more than they can help when the attitude of the firm is disagreeable. Too many lighting companies give the impression "the public be damned." If this attitude or apparent attitude exists, it must be corrected before much progress can be made, because the consumer refuses to use any more than he must from necessity.

Educating to the Electrical Appliance Idea.

The consumers as a whole do not understand the uses and advantages of electrical appliances. The public has long fostered the idea that anything electrical is mysterious and can be understood only by electrical experts. This idea as far as uses, advantages and application are concerned, can and should be overcome by proper educational means. If the consumer is properly educated to the idea of the home electrical, he will not have to be sold the appliances, as he will seek to purchase them of his own accord. The consumer who buys of his own accord due to being properly educated is a better booster and more satisfied customer than the one induced to buy by a salesman.

If the consumer gets something that does not do the work he expected of it, or which fails because of being a cheap, faulty appliance, his tendency is to throw it away and condemn all electrical appliances. Conflicting statements regarding the same thing cause suspicion and people tend to keep away from things they are suspicious of.

If people are told a thing often enough, long enough and loud enough, they will eventually believe it themselves. The prejudice of a person against a purchase is more easily broken down when he is urged to buy the same thing from many different sources. The consumer avoids dealing where his confidence has once been betrayed. If the consumer has an appliance out of repair, his tendency is to let it go when there is much trouble to getting it fixed.

From the selling standpoint, the one big thing to accomplish is to sell the idea of the "Home Completely Electrical" and business and results will follow.

Central Station and Contractor-Dealer.

The policy of the central station can now be worked out to meet the above outlined conditions. The first question and the one which has been discussed more than any other is:

Shall the central station leave all the merchandising to the dealers; or should they both merchandise; or should the utility adopt a merchandising policy that will prohibit the dealers from staying in business? To meet the conditions found by analysis, it is necessary that both dealers and central station merchandise, but both must use clean, fair, undiscriminating methods. This gives protection to the central station against the dealers failing to sell appliances and building up its business, which business is necessary for its success, and if the policy of the central station is right, the dealer will be helped. This double merchandising accomplishes several things as follows:

1. The consumer's confidence in electrical appliances is strengthened by the fact that the central station endorses the appliances.

2. The consumer, who believes that the central station sells only wasteful appliances because they run his bills up, knows he can purchase of a dealer who will sell on merits because the dealer is not interested in the bills of the consumer.

3. The central station has a better chance of bringing the attention of electric appliances to the public because a larger volume of people call there. The more people that know about electrical appliances, the larger the field of buyers and the dealer gets his share.

4. Creates a better grade of electrical dealers, for if the dealer does not make his store attractive, the central station will get the business. This is good for the dealer, for it stimulates him to keep his store attractive and in first-class shape. The result is more business for him and to every one's benefit who does a legitimate business, for the unfair, unscrupulous dealer who discredits the industry is forced to quit.

5. With the central station and dealers all up-to-date and pushing electrical appliances, the consumer's attention is called to their wares more consistently and the "Home Electrical Idea" is "put over" more quickly.

6. Makes sales possible to people that become interested in an electrical appliance they see on the display floor of the central station while they are in the mood for purchasing that possibly would not be made if the customer had to take the trouble of going to some other address the central station might refer them to for making the purchase.

To meet the conditions further, the relation of the dealer and central station should be along the following lines:

The central station should keep in mind that every good appliance sold by the dealers helps him accomplish the desired results. The dealer, therefore, is an asset, and as he has to make a profit, the central-station prices should be such that they will not unfairly cut the dealer's legitimate profit.

The central station should develop the sale of hazardous selling appliances till they are started and on a basis where the dealer can profitably handle them.

It should assume the attitude of let the dealer sell the appliance, but if he does not, see that the appliance is sold anyway, but at a fair price.

The central station should carry the most of the burden and expense of educating the public and selling the "Home Electrical Idea." On account of the expense and delayed returns from education or missionary work, as it is sometimes called, the central station is the only one that can afford to do it, because it will get its returns from current sold, where if the dealer is forced to do it alone his profits are cut so low that he is unable to stay in business. The central station can accomplish this by having capable demonstrators employed to sell the "Home Electrical Idea." On account of the large number of electrical consumers that call through necessity at the central station, all household appliances should be arranged in a neat display so they can be properly demonstrated. This opportunity for educating the public should not be overlooked. The advertising used should be along educational lines rather than pushing any particular make of goods. Attractive household hints and methods of using the electrical appliances illustrates this point. The architects and home builder should be kept posted and taught to come to the central station whenever they need help.

The central station should educate the dealer who has had less experience, especially in determining his costs, especially overhead expenses, for a dealer that

knows his costs is never a price cutter that corrupts the business. The central station should keep in close touch with the electrical dealers, learn the dealers' ideas and viewpoint, help them solve their problems, and above all never betray their confidence. The dealer should first of all keep in touch with the central station, get its viewpoint, and co-operate with it.

The central station should run a capable repair department handling most of the repair business at moderate charges. This is neither a desirable nor profitable business for the dealers.

The dealer should at all times sell at a price that gives him a legitimate profit, overhead included, for the evils of price cutting will eventually hurt himself as much as his competitor. His store should be kept neat, clean and attractive. Remember that many of your customers are women, and store appearance as well as personal appearance either make or lose sales with this class of customer. This may seem ridiculous to bring out this point, but it must be admitted that the electrical dealer in many instances has been sadly negligent on this point. The dealer should realize that in selling electrical appliances, service after the appliance is sold enters more into the electrical retailing than any other, and he must make provision for it.

Both the central station and dealer should combine on the following points:

Elimination of all cheap, unreliable merchandise. Handle only goods of known quantity that can be guaranteed.

Conflicting statements regarding the same appliance should be avoided. For example, several different costs to operate are given by as many different dealers on identically the same make and kind of appliance. Conflicting statements create suspicion in the minds of the consumers.

Goods should not be sold that do not meet the customer's requirements. It is better not to sell at all than to do this.

More benefit is obtained if all advertise the same appliance at the same time. It focuses the attention of the buying public on to one thing, lessening confusion in his mind. Get together on your advertising.

From the conclusions brought out, the desired result is the all-important item, for it is proven that the desired result will only be obtained when the method and policy is right and fair to all.

The whole thing summed up can be expressed in the phrase, "Sell the Home Electrical Idea," and the right result and sale of appliances will follow.

FEATURES OF ELECTRIC DRIVE IN NEW PAPER MILL.

Puget Sound Plant Has Connected Load of Nearly 700 Hp., Using 2200 and 440-Volt Motors.

By W. A. Scott.

The new plant recently completed and put in operation by the Cascade Paper Co., of Tacoma, Wash., has a manufacturing capacity of 20 tons of paper per 24 hours. Its several products include book paper, lithographers' and newspaper stock, railroad and commercial paper. About 75% of the material used consists of discarded magazines, newspapers and other waste papers; the other 25% consists of new wood pulp of spruce timber. In addition to waste paper and pulp, there is required a small quantity of white clay filler, rosin, alum and other ingredients.

The plant's location is on Chambers creek in the vicinity of Steilacoom, which is about six miles from the business center of Tacoma. The mill premises have a frontage on an arm of Puget Sound, affording water transportation. The striking features of the plant are the concrete and brick structures in which the power equipment and factory machinery are housed. The principal mill building consists of a main 3-story structure and two wings, all planned to meet the requirements of a modern paper mill. The motor installations, representing a connected load of nearly 700 hp., from the lines of the Tacoma municipal system, are all belt-connected to the various machines. Of the 16 motors in use, there are 8 having a combined rated capacity of 575 hp., which operate at 2200 volts; the 8 others of an aggregate capacity of 107½ hp., run at 440 volts.

The city's two 300-kv-a. transformers receive energy at 50,000 volts, delivering it to the main 7-panel switchboard of the mill at 2200 volts, 3-phase. All 2200-volt current is carried by 3-conductor, lead-covered cable, which lead from the oil switches through a wood pipe to the main distributing panels in the south wing for connection to the 2200-volt motors in the several mill departments. Other cables carry 2200-volt energy to three 50-kv-a. transformers by which it is stepped down to 440 volts for the other motors, and one 50-kv-a. transformer for furnishing current at 220/110 volts for the three-wire lighting.

Beginning on the top floor of the north wing, where waste papers are prepared for the processes that follow, we find a 40-hp., 440-volt motor driving a high-speed shredder, and through other belt and pulley transmission it drives one mechanical cleaner and a fan duster, both at slow speed. These are followed by an agitator and mixer, operated by a 15-hp. motor.

The next step in the process is seen on the next floor below, where a 75-hp. 2200-volt motor drives a set of mixing rolls in each one of two steam cookers. The motor in this case is belted to the two sets of rolls from a pulley on each end of the motor shaft. The pulp is passed by gravity from the cookers to tanks containing mechanical agitators, driven at slow speed by a 75-hp. motor. Then the pulp is raised by suction pumps to a series of screens, the screened material passing to two sets of washing rolls, each set being driven at 80 r.p.m. by a 75-hp. motor. This product, in bleached condition, is then subjected to the beater process. There are four beaters, running at 80 r.p.m., driven by two 75-hp. motors. Then follows the final reduction to a pulp of extreme fineness in Jordan machines, driven by a 100-hp. motor. After passing two sets of motor-driven screening devices, this slightly viscous, semifluid mass starts on its course through the automatic processes of the steam-operated paper-making machine, by which the finished product is turned out.

By reason of the fact that steam is necessary in cooking the pulp and for keeping it at the right temperature in the successive processes, a steam plant was built and equipped. The large, intricate paper machine is steam-operated partly because of the flexibility thus given in regulating the speed.

An evenness of temperature throughout the building is maintained by two motor-driven Cyclone fans which force hot air through ducts to all floors and compartments.

All the electrical equipment and fixtures were furnished by the Westinghouse Electric & Manufacturing Co., and the installations were made under the supervision of E. J. Barry, electrical engineer, Tacoma. The board for distributing the circuits, and other features, were Mr. Barry's design.

Detection and Remedy of Current Theft from Central Stations

Methods Employed by Large Companies in Correcting this Quite Common Abuse of Service

By THOMAS ROBSON HAY

Duquesne Light Co., Pittsburgh, Pa.

WHILE the full extent of the loss incurred by central stations through current theft will probably never be accurately known, it is admitted by the majority to be considerable. Nevertheless, inability to successfully combat the current thief has forced many central stations, especially the larger ones, to apparently ignore this loss although fully realizing its immensity. In this article, Mr. Hay describes the more common methods employed by the current thief, possible means of detection and the rather satisfactory results obtained by the Duquesne Light Co. of Pittsburgh, Pa., in its efforts to eliminate this practice by its customers.

In the majority of the cases, as shown in Mr. Hay's article, the theft was unintentional and in all probability its discovery and correction were as satisfactory to the consumer as to the company. It is probable, therefore, that the company instead of losing favor by its activity in this direction, increased the public's estimation of it as a business firm and by utilizing the financial return in improving its service.

THE growth of the central station with its many customers, large and small, has naturally made possible abuses by those so inclined that are difficult to detect and to punish. Of all abuses, theft of current is perhaps the most difficult to handle. Such abuse may be by those who would resent any accusation of common thievery or it may perpetrated by those without scruples and who are noted for sharp and shady dealings. In most cases theft of current is practiced by small shopkeepers, many of whom do business on a "shoestring," or by residential customers who think they are keen enough to beat the company and get away with it without being detected.

Perhaps the fundamental reason for such practice is psychologic and its underlying cause is the generally popular conception that it is perfectly legitimate and proper to "beat" a corporation when the occasion and opportunity for so doing are present. Most small users conceive of a corporation as an inanimate thing with plenty of money and perfectly able to donate small amounts of current. The individual amounts are of course small, but in the aggregate they will usually amount to an appreciable item.

The usual offender considers himself as upright as any one. It is the opportunity that makes the thief. The old fashioned cash drawer-open, and the unprotected meter are too much for some people. The man who gets his current, or part of his current, for nothing believes himself no more guilty than when overlooked by the street car conductor. Anyone with a slight knowledge of electrical practice is often tempted to try his hand. He just wants to see if he can beat the game.

The detection of the current thief is made possible in a number of ways. The special meter tester, the periodic meter tester and indicator tester discover the greatest number of cases at the time they are making tests and inspections on the customer's premises by inspecting all wiring and connections about the meter. The meterman and complaintman may also discover irregularities while changing meters or attending to a no-light complaint, and a few lead-offs may be received from meter readers as in making their rounds they may note that the customer is using light that is not registering on the meter. The actions of the customer in trying to remove the temporary jumper frequently betray the culprit. Comparison of the monthly readings with preceding periods will also, in cases, indicate theft. When an intentional theft is discovered the tester leaves the connection as found, in order not to arouse any suspicion that the irregularity has been detected. A detailed report is made by the meter division, or, is discovered by the meter installer or complaint man, a report is made out by the district superintendent, and is forwarded to the contracting department. The contracting department will immediately issue an order to the district superintendent to place a check meter in a dummy transformer case on a nearby pole, and connected in series with the meter of the suspected customer. In this way, it is possible to find out what the actual correct consumption is, and a direct basis for determining the amount of loss, and collecting the portion not registered by the regular meter, is afforded. The readings of the customer's meter and the check meter are compared for a few months, and when it is discovered that a large discrepancy exists, an investigation is made at an unusual hour by two company employees, in order to collect all the evidence possible. There are other methods used, but the one mentioned is the most common.

The most common method in use by current thieves is to remove the line wire at the main switch ahead of the meter and place a temporary wire or jumper from the blades of the main entrance switch to the contacts on the panel cut-outs, or in other words, "jumping around the meter." Another common method on two-wire service where three-wire meter loops are employed, is to disconnect the middle or shunt wire at the main fuse block or switch. Where a three-wire system is in use, 110 and 220 volts, and three-wire meters are used, the customer can prevent registration

of his current on the meter by simply backing out the outside fuse on the three-wire main fuse block. In the three-wire system the potential coils of three-wire meters are connected directly across the 200 volt outside wires, therefore if the fuse is backed-out or a blown fuse substituted for a good one, the potential coil is "killed." The placing of jumpers on the line and load wires is the most common method employed in securing unlimited service where indicators are installed.

In another instance it was found that the seal of the indicator was broken and the top contact screwed down so that it would not break the circuit. The main adjusting stem was stuck to the bottom of the indicator with candle grease, thereby obtaining uncontrolled service. Another form of irregularity is the connecting of lighting circuits and beer pumps to flat-rate fan circuits. Then again customers have been detected using fan service on old flat-rate fan circuits that had not been removed and without having renewed or made new contracts for service.

After all the evidence has been secured the customer is notified to call at the main office of the company with a view to making a settlement for the use of unmetered service. A detailed report of the irregularity, with the evidence, as in the case of a jumper properly tagged which caused the irregularity, is turned over to the proper official.

The customer is informed of the seriousness of the offense, and an effort is made to find out when the trouble first affected the registration, and who informed the offender how to make the connection. An estimate is made of the amount of energy illegally used.

The following is a record for one large central station of the actual cases investigated and from which judgments were secured:

31	Cases of intentional theft, for which there was collected in a period of nine months	$4,316.04
59	Cases of unintentional theft, for which there was collected in a period of nine months	2,538.31
	Total	$6,854.35

Settlements for theft of current now average $761.60 per month, or approximately $10,000 per year.

Opinions in the past have varied as to the value of the current stolen by customers on this system in any yearly period. The results of the first year's effort in clearing up the situation do not fulfill the expectations, nor coincide with the judgment of those who have had experience in the matter of detecting irregularities, especially as to the amount and distribution. It is believed, however, that if periodic inspections and tests are made at intervals of one year, rather than three years, as has been the practice with this company, that the number of irregularities detected would undoubtedly be doubled, with a corresponding increase in collections for stolen current.

One hundred and fifty-nine irregularities were reported and corrected, and upon investigation it was found that the majority of these irregularities were by customers using service on a flat-rate basis. This service is controlled by indicators. It is usually found that the customer overloads the instrument, resulting in its operating improperly, and thus allowing unlimited use of current. When customers are using electric irons, vacuum cleaners, and fans on a flat rate, in adjusting any irregularity, it is insisted that the customer sign a meter rate contract. The location of meters and indicators is changed, and reports of meter seals that have been broken are investigated. Frequently tenants of apartments have been caught tampering with the indicators for the lighting of the public halls. An average of 28 irregularities are investigated per month, and approximately 400 irregularities are reported during a year.

To prevent the theft of current great care should be taken in the installation of the service wiring. The distance from the service entrance to the meter should be as short a run as possible. The service wiring should be enclosed in rigid iron conduit run directly into an approved sealed metal protective device, where the meter terminal wires and main entrance switch and fuses are under seal and free from tampering. A broken seal, when located, requires immediate investigation.

When adjusting the settlement of an intentional theft of current case, the customer at his own expense is required to equip his service as mentioned above.

To detect such thefts, by means of the necessary evidence, and then to secure payments for the amount stolen requires tactful and careful handling on the part of the central station. The culprit must be made to realize the real measure of his offense and payment must be secured, where possible, without court proceedings. Otherwise the cost of collection may more than offset the amount collected. In carrying on the negotiations, looking to the collection for amounts claimed as being due it is perfectly proper to contend that every kilowatt-hour of current stolen becomes a public nuisance and a handicap to the rendering of more satisfactory service, for the reason that collections from the given district are reduced by the value of the amount of current stolen. This amount when capitalized to improvements may make possible material betterments of service, which may be prevented, because of low revenue returns from the particular district.

In the last analysis it is not only the loss of revenue, but also its affect on the total amounts collected and its relative injustice to honest users that should recommend, to all central-station plants, an earnest and continued effort to put a stop to such practice.

IMPROVEMENTS AT LONG LAKE HYDRO-ELECTRIC PLANT.

Third Generating Unit and Transformers Added to Supply Milwaukee Railroad Electrification.

The Washington Water Power Co., Spokane, Wash., recently completed the installation at its Long Lake hydroelectric plant of a new bank of three General Electric single-phase transformers of 6500 kv-a. and plans contemplate installing another bank of this capacity next summer.

The capacity of the Long Lake plant is to be increased by the installation of a new General Electric generator, rated at 13,900 kv-a., but which with forced-air ventilation will be capable of 19,400 kv-a. The prime mover for this generator will consist of an I. P. Morris twin water turbine of 22,500 hp. The generator is to be shipped from Schenectady, N. Y., about April 30. This installation, when completed, will give the Long Lake plant three generating units of 19,400 kv-a. each. This additional power will be used to supply the Chicago, Milwaukee & St. Paul Railway's substation at Taunton.

Editorial Comment

Lighting Codes

FOLLOWING closely in the footsteps of numerous reforms for improving working conditions in our industries comes the state industrial lighting code which has already been adopted by a number of states. Lighting codes have one main object to accomplish: improve lighting so as to reduce accidents. However, improved lighting also results in increased production, better quality of product, less spoilage, etc., all of which are items of vital interest to every manufacturer.

All branches of the electrical industry can benefit by working for widespread adoption of such codes.

Uncertainty of Utility Rates

WHEN the cost of fuel, labor and supplies made such tremendous advances a large number of central stations applied to their state commissions for relief in the form of increased rates. In some states the commission permitted temporary increases for six months.

With prices continuing abnormally high these companies have had to go before the commissions every six months to have the time extended. In addition to being an expensive procedure this has kept utility affairs in a very much unsettled condition, for which the public has to pay in the end.

Concerted action should be taken to relieve this situation.

Discouraging Convenience Outlets

IN AN answer appearing in the Questions and Answers Section of this issue one of our contributors mentions the practice of some central-station companies in estimating the demand of residence and apartment customers by taking a percentage of the total number of outlets as active in creating the demand, each outlet being given an average rating of 40 or 50 watts or thereabouts. Where a customer has a large number of convenience outlets or numerous outlets for obtaining variable lighting effects he is likely to be penalized thereby, since his estimated demand will likely be in excess of his actual maximum.

Central-station companies are almost invariably heartily in favor of more outlets since this favors more complete electrification of the home. The practice mentioned, however, actually tends to retard the householder from providing more outlets. It would therefore be well for central stations that use this method to consider revising it since they are unlikely to insist on any rule that hampers further electrical development.

Chicago in 1920

THE selection of Atlantic City as the place for the "Victory" convention of the National Electric Light Association was entirely fitting. Although there is much serious business to be transacted, there is no denying the fact that entertainment features and social diversions have considerable bearing on the attendance and in this respect the famous sea side resort has no peer. The hotel and exhibition facilities at Atlantic City are also of the best.

This, however, will be the third consecutive national meeting of the Association in the East. When plans for the 1920 convention are taken up Chicago should be given consideration.

Co-operation in Labor Questions

ENGLAND has just given us a splendid and practical way to prevent the present industrial unrest that is sweeping so many countries in Europe from being converted into bolshevism. As the result of prolonged conferences between representatives of capital and labor, there has been worked out a constructive program of the most hopeful kind. Among other things, it brings about many betterments in the conditions for English workmen, establishes the means for settling future disputed points and provides for immediate clearing up of the industrial situation.

Here we have an excellent example that may be followed with profit in other countries, including ours if occasion requires. There is no surer way to solve industrial discord than by such conciliation, co-operation and concord.

Dealing With Current Theft

CURRENT theft is a condition that every central-station company may be called upon to deal with at any time. It is a matter in which legal, moral, mental and financial considerations are involved.

Current theft may be a simple or difficult matter to accomplish, depending upon the utility. Likewise, the extent to which current theft is practiced, and how long persisted in, depends upon the utility. Slovenly, careless methods of making installation and doing business tend to encourage current theft. The company that plays fair with its customers, maintains an efficient system, adheres to first-class installation methods and acts in a highly honorable manner should be the least likely to suffer theft of current from unscrupulous and antagonistic persons. An article by Mr. T. R. Hay in this issue discusses the subject from various angles.

Business Optimism versus Business Pessimism

WE WERE told shortly after the outbreak of the World War that the business depression we were then experiencing was mainly psychological. Such was really the case, as a little foresight upon the part of business men in general would have caused them to see the prosperous times that were in store for us. Today we are beginning to hear business men complain of hard times being in sight with the result that many of them are resting on their oars, little thinking that by so doing they are merely tending to depress their own business. It is this sort of thinking upon the part of business men that brings on not only psychological hard times but actual hard times as well.

Business today is good and it will remain good. It is, of course, not as good as the boom days during the war but there is plenty of business in sight for all. To obtain it, however, requires modern progressive and intensive sales efforts of at least as high a caliber as in the days before the war. A seller's market no longer exists in most lines. Firms cannot depend upon business seeking them but must go out and seek business. Salesmen must forget the days when they were mere order takers and must practice the art of selling as enthusiastically and as scientifically as in the days before the war. But one cannot place the entire burden upon salesmen. They must be backed up by strong advertising campaigns and the other generally recognized adjuncts to selling. Markets, in a good many cases, have changed, while in other cases their requirements have changed. Business houses of all kinds must, hence, study their market and find out what portion of it they are now reaching and take steps to reach a larger fraction of it. They must also meet any changed conditions in these markets.

Another factor that is causing many businesses to rest upon their oars is a belief that almost any day will see rapid drops in raw material and commodity prices. Yet when the European war broke out we had just about recovered from the abnormal conditions resulting from our Civil War. Conditions after our Civil War were more favorable to a rapid falling of prices than they are at the present time. It will be some time before we return to pre-war prices and wages. This has been well pointed out by Mr. F. T. Miller, director of the Division of Public Works and Construction Development, United States Department of Labor. After reminding us that we have about half the gold in the world and that the war is over, he points out that there seems to be a general belief that prices will drop and that it is creating a harmful psychological condition in business. If we had our two million soldiers home again, if we had received our normal influx of immigrants during the war, if all peace adjustments had been made and if all were working under normal conditions, if we had three to five billion dollars' worth of dwellings and apartments which we are short, if all of us were working steadily and if we were not forced to send large portions of many commodities abroad, Mr. Miller says prices might be the same as in pre-war times. These conditions have not been realized and will not be realized for some time. Prices that have dropped—such as the recent reduction in iron and steel products—have, as a rule, been due to special conditions or represent a sacrifice upon the part of some interests in order to promote business optimism. But the inertia of economic events is a continuing force. We must all take conditions as they are, familiarize ourselves with them and act accordingly. We cannot sit back twiddling our thumbs and looking at them with the vain hope that some mysterious force will change them back to their pre-war nature.

This is a period of readjustment to normal good peace conditions and as such is a period that will witness the transition of many businesses from one line of endeavor to another line of endeavor and the launching of many new enterprises. It is, hence, a period that is not without its dangers to long-established businesses. Many of these were unable to supply their customers' wants during the war and these customers were forced to turn to one's competitors. These customers have, hence, formed new buying habits which are none too easy to break even at the present time in many cases. If they are not regained at this time, they will buy of one's competitors or from newly launched concerns, thus making it still more difficult to regain them at a later date. Firms that are progressive and optimistic enough to turn from a war-time endeavor to a peace-time product at this time, as well as newly launched concerns, will do all in their power to capture one's previous markets by intensive selling and advertising methods at this time. Psychological hard times will never reach or halt them. They will adjust themselves to present conditions and go after business actively on this basis. The long established concern that will not recognize present conditions and adjust itself accordingly and that will let itself be influenced by every psychological wave that gives an excuse for inactivity, will soon find itself in the position of poor Rip Van Winkle when he awoke from his long slumber. Even poor Rip's dog didn't recognize him. Even the most loyal customers won't recognize such a firm that has failed to meet its obligations to its customers and to business in general during this readjustment period. It is a very easy matter to lose one's identity as the buying public is prone to forget.

Higher Fares for Street Railways

THAT the street railway systems in the country are in need of financial assistance cannot be controverted. The decline in the monetary value of the nickel, a decline of 40% during the past two years, has placed these systems in a position in

which they are compelled to pay largely increased operating and maintenance charges from income inadequate to meet these charges. No industrial organization can exist long under such conditions. Since financial distress of urban railways is always contagious to all industries and activities in their localities, public service commissions, municipalities and legislatures should make concerted effort to prevent such distress by providing for increased fares or for municipal subsidies.

Some light is thrown on the municipal railway situation by the action taken by the City Club of New York on March 29. A memorandum sent to the New York Legislature contained, among other things, the following paragraph.

"The choice between these alternatives (higher fares and municipal subsidies) obviously, is a question of municipal policy under the circumstances applicable to each individual city. The problem of street railway service and finance has become so acute that it is beyond the power of private corporations to solve it without more effective co-operation than the municipalities are in a position to give under existing laws. We cannot tolerate a breakdown of transit service. We cannot expect to get the adequate and efficient service essential to municipal development without paying for it, either through fares or through taxation. From the financial standpoint, the situation has become so difficult for the private companies that the expense of securing capital needed for additions and extensions is almost prohibitive."

The public must be brought quickly to realize that provision for higher fares or for subsidies is necessary to continued service. The allowance of higher fares, which is the most expeditious means of relief, is also the most nearly equitable.

Japan's Electrical Industries

JAPAN'S electrical industry was given a developing incentive due the fuel situation and unprecedented industrial expansion during the last few years resulting from the World War. At the end of 1918 the use of electrical power was estimated to be saving 176,319,800 gallons of petroleum and 4,000,000 tons of coal per annum.

In light and power plants, $183,688,687 had been invested by the end of 1918; $21,793,408 in electric tramways, and $165,998,245 in plants both for supplying power and light and operating tramways. The total amount of capital invested amounted to $371,480,340, a gain of $32,160,727 over the close of 1917. The investment in this comparatively new line is, says the official report, bigger than that in mining, which stood at $119,640,000 at the end of last year. It even threatens to rival the investment in railways, which is $548,350,000.

The above figures, excerpts from the *Japan Advertiser,* and appearing in the March 21 issue of *Commerce Reports,* emphasize the rapid awakening of Japan as an industrial nation and as a user of electricity. Further, the figures indicate that Japan offers a big opportunity as a purchaser of electrical apparatus. To what extent the market existing and awaiting development affords an opportunity to American enterprise and initiative depends upon many factors, of which the two most important are perhaps enterprise and initiative. The market is there for both apparatus and for utility promotion.

Forcing Electification of Coal Mines

SWEEPING concessions, the seven-hour day for two years and the six-hour day thereafter, and a radical wage increase are some of the concessions that appear to be about to be granted to British coal miners.

The cost of labor is a big item in the cost of coal. British miners have far lower productive capacity compared to American miners, a fact tending to make the labor cost a still further drawback in economic competition in the world trade. While American mines are not as yet operated electrically to the extent that they might be, at the same time they are far in advance of British coal mines. If the British miners are to have a seven and eventually a six-hour working day, if fuel costs are not to become a serious factor in the economic and industrial growth of the country, the use of labor-saving apparatus and mechanical effort in place of manual labor—which means mine electrification in nine cases out of ten—must come apace. We may look for the electrification of Britain's coal mines to make quite rapid headway, therefore.

The Victory Loan

VICTORY with glory was achieved through our participation in the World War. It was attained at a terrible price in life, blood and treasure. When we joined in the war we were entirely unprepared and it was expected that not until the spring of this year would we be able to take so effective a part in the conflict as to bring it to a successful close. By accelerating our preparations, however, and making all arrangements on a very large scale, we were enabled to throw a big, vigorous, young army into the fight just at the critical period of the enemy's most desperate attack. Thus, imminent defeat was turned into victory, the war's end was shortened by possibly a year and perhaps hundreds of thousands of lives of our men alone, not to mention greater numbers of our Allies, were saved.

To do this has cost our Government many billions of dollars, but it was well worth the price. Uncle Sam has had up to the present time to spend much larger sums than were at his disposal. Therefore, he is asking all his loyal citizens and friendly alien residents to participate in the Fifth Liberty Loan—the Victory Liberty Loan. Between April 21 and May 10 we will have an opportunity to take care of all these urgent war obligations and clear the financial decks for the needs of normal business. Let's Finish the Job.

Week's Events

Bureau to Educate Retail Electrical Dealers — American Welding Society Holds Meeting — Seattle Traction Sale

THE 1919 VICTORY CONVENTION OF THE N. E. L. A.

From the Curent Issue of the National Electric Light Association Bulletin.

THE coming convention in May is to be a Victory Convention. Not alone will it celebrate the National victory, which belongs to all patriotic Americans, but also that large share of glory which belongs to the electrical industry for its contribution in brains and effort to that end.

At our entrance into the World War the importance of electricity and electric power was immediately recognized, and all engaged in that line of endeavor were not found wanting in their ready response to the call made upon them. Through the agency of the National Committee on Gas and Electric Service, formed in May, 1917, with John W. Lieb, then president of the National Electric Light Association, as chairman, ably supported by George W. Elliott, as secretary, with an office in Washington, there was rendered to the Government the full support and co-operation of the gas industry, as well as of the electric central-station industry of the entire country.

With the return to peace times, new problems and conditions have to be dealt with, these naturally resulting from the increased scope and extent of the activities brought about by the phenomenal growth during the unusual times through which we have just passed. Thus this convention will mark a new start for the electrical industry towards still greater achievements.

It is, therefore, hoped that the attendance will be large and representative; that not only will all of the member companies be represented by their responsible executives, but that it will also be found expedient to have a large number of men from their organizations in attendance, as there is so much of importance to be discussed that is of interest to all.

President Wells has promised a program that will be both broad and comprehensive, details and particulars of which will be printed in full in the April issue of the *Bulletin*. In the meantime each member will receive a copy of the convention circular, giving particulars as to registration, transportation and hotel accommodations. The exhibition, for which plans are practically completed, will be of proportions seldom equalled and probably not heretofore exceeded by similar displays of electrical apparatus and devices.

BUREAU OF EDUCATION AND RESEARCH TO STIMULATE SALE OF ELECTRICAL MERCHANDISE.

National Association of Electrical Contractors and Dealers Creates Bureau to Collect Information for and to Educate Retail Electrical Dealers.

An innovation of great interest to the electrical industry is being undertaken by the National Association of Electrical Contractors and Dealers through the creation of a bureau for the collection and compilation of data and statistics to show what is needed to increase the retail distribution of electrical merchandise and place it on a more efficient basis, and to place this information before those in the industry in the various localities of the country, thus enabling them through local co-operation to bring about the desired results.

A special committee has been put in charge of the organization of this Bureau of Education and Research consisting of: W. Creighton Peet, of Peet & Powers, New York City, chairman of the National Association; M. Edwin Arnold, of M. E. Arnold & Co., Philadelphia, chairman of the National Membership Committee; A. Penn Denton, of the Economy Electric Construction Co., Kansas City, Mo.

The formal announcement of the new bureau has been issued by W. H. Morton, general manager of the Association, in substantially as follows:

Objects.—To collect from all sources information relative to the best methods of improving and increasing retail distribution.

To place this information before the industry in various localities, and through local effort to urge all those now engaged in the retailing of electrical material to increase their efforts and to conduct their business along economical and efficient lines, and to especially endeavor to get contractor-dealers who are not retailing to develop this branch of the business, to the end that retail distribution will be increased and the contractor-dealer will be placed on a more stable basis.

To give retailers, through printed matter and personal visits, the information which they evidently need to enable them to conduct their business on recognized business lines.

Method of Operation.—The work of the Bureau is to be carried out by obtaining in the various localities throughout the country co-operation between the manufacturers, jobbers, central stations, and retailers, so that all branches will be working together to increase the retail distribution of electrical material.

The preparatory work is to be done through suitable printed matter, laying out the aims and objects of the work, and what is necessary to accomplish the results.

This to be followed by personal field work done in the various localities, which primarily will be for the purpose of getting together the parties interested and directing their efforts toward the results desired, so that all sections of the country will be working to accomplish the same end.

The foregoing work is to be supplemented by a series of lectures on the following subjects, each lecture being written by specialists in the line treated, such as: Management, selling, accounting, estimating and installing.

These lectures will be prepared complete by the Bureau in such form that they can be furnished to any locality, but the entire arrangement for and delivery of the lectures to

be under local supervision and at properly advertised open meetings.

The recent lectures on cost acounting and estimating have demonstrated the need and value of such lectures.

Where the circumstances do not warrant the delivering of the lectures, the subject matter will be furnished in printed form to the retailers in such territory.

Field Work.—The work of the field men for the Bureau will consist of calling on the various interests in the electrical industry in the different localities for the purpose of getting them to work together on a board co-operative plan to improve the distribution of electrical material in their territory.

The field men will also be prepared to show the retailer when requested, how to improve his store; how to improve his business methods along economic lines; how to install and carry on proper cost accounting and bookkeeping systems; and to take up any subject on which assistance is requested.

Financing.—While it is felt to be necessary that this work be carried on by the retailers' organization, it is recognized that the retailers are not in a position to finance this educational work at the present time unaided, and for this reason financial support is asked from manufacturers, jobbers, central stations, and others interested in obtaining the results outlined.

As subscribers will be directly benefited by the increased sale of resale material and current-consuming devices which will be produced by the work of the Bureau, they are asked to subscribe on a yearly basis, a sum approximately equal to 25 cents on each $1000 worth of sales of such resale material, or in the cases of the central station, the sale of current, with a minimum subscription of $50 per year, and a maximum subscription of $10,000 per year; excluding sales of material for export and any sales to governmental or state departments. The amount of the individual subscriptions will not be made public.

The money contributed to the support of the Bureau will be expended by and through the National Association of Electrical Contractors and Dealers with the understanding that part of the expenditures will be for general work covering the entire country, and part will be on special work in the different localities in proportion to their numerical membership in the National Association; resulting in each locality receiving benefits from the working proportion to the activity and interest shown by those concerned in the industry in such locality.

Privileges and Responsibilities of Subscribers.—All subscribers to the Bureau of Education and Research will be accorded all the privileges of associate members of the National Association of Electrical Contractors and Dealers; that is, the right to attend meetings and participate in all discussions and to receive data and information, it being distinctly understood that subscribers exercising any or all of these privileges do not in any way take on the characteristics of membership or assume any liability for any of the acts of the Association.

A list of subscribers, without naming amount subscribed, will be distributed, and the representatives of subscribers will be welcomed at all meetings of the National Association or of any of its branches.

Advisory Committee.—There will be an Advisory Committee consisting of representatives from each branch of the electrical industry; namely the manufacturers, the central stations, the jobbers, the engineers, and the electrical press, to be selected through consultation with the subscribers from each branch. Matters of policy will be passed on by this Advisory Committee before being finally acted on by the managing committee.

Management.—The management of the Bureau will be under the direct control of a committee of three members of the National Association of Electrical Contractors and Dealers, the national chairman being a member and the chairman of this committee.

Results to Be Obtained.—It will be seen that the work of the Bureau is primarily devoted to the education of the contractor and retailer, so that they will appreciate the importance of actively increasing the retail distribution of all kinds of electrical materials, and improving their business methods.

The work will further result in the stabilizing of the contracting business of the country by inducing contractors to operate retail stores requiring a fixed permanent investment in their business.

The increase in the number of retail stores, the education of the retailer to properly handle appliances, and the increase of suitable wiring for the use of appliances must of necessity increase the sales of materials, and through the sale of current-consuming devices increase largely the use of current.

Use of Funds.—It should be especially noted that the funds of the Bureau are not to be applied to regular work of the National Association (which in the year 1918 cost approximately $35,000, and is on a self-sustaining basis); the benefit to the National Association arises from the improvement in the general business conditions of the electrical contractor-dealer, and the increase in membership, which will tend of itself to improve, increase, and stabilize distribution.

AMERICAN WELDING SOCIETY HOLDS FIRST MEETING.

Officers Elected and Constitution and By-Laws Adopted by Enthusiastic Society.

The first meeting of the American Welding Society was held on March 28, 1919, at the Engineering Societies Building, 33 West 39th Street, New York, and the constitution and by-laws were adopted as recommended by the Organization Committee.

The following officers were elected: President, C. A. Adams, Cambridge, Mass.; vice-president (for 1 year), J. M. Morehead, New York; vice-president (for 2 years), G. L. Brunner, Utica.

Directors for 1 year: W. M. Beard, New York; M. H. Roberts, New York; M. M. Smith, New York; L. D. Lovekin, Philadelphia; Alexander Churchward, New York; W. H. Patterson, Pittsburgh; Walter J. Jones, Philadelphia; C. A. McCune, New York.

Directors for 2 years: R. R. Browning, New York; A. S. Kinsey, Jersey City; Victor Mauck, Conshohocken; E. L. Hirt, South Bethlehem; J. F. Lincoln, Cleveland; H. M. Hobart, Schenectady; D. C. Alexander, New York; H. R. Swartley, Jr., Jersey City.

Directors for 3 years: L. H. Davis, New York; E. L. Mills, New York; D. B. Rushmore, Schenectady; James Burke, Erie; D. H. Wilson, Jr., New York; Hermann Lemp, Erie; C. J. Nyquist, Chicago; Alexander Jenkins, Baltimore.

It was voted that the charter should be held open for ten days and that those applying for membership in the American Welding Society before April 8 should be considered charter members.

At a meeting of the directors in the afternoon, W. E. Symons was appointed treasurer and H. C. Forbes, secretary.

This Society will merge the Welding Committee of the Emergency Fleet Corporation, and the National Welding Council, and will include others who may be interested. It is the purpose of the Society to become a disinterested and dependable source of information on welding, not only for the benefit of the manufacturers of welding apparatus and supplies, but also to aid those who use welding in their production and those who purchase welded goods. The Society will give greater stability to welding by standardizing welding processes and thus make its economies available in a wider field of industry.

SEATTLE RAILWAYS TAKEN OVER BY CITY.

A. W. Leonard of Puget Sound Company Predicts Better Operating Conditions.

The purchase by the city of Seattle of the street-railway system of the Puget Sound Traction, Light & Power Co. was consummated March 31, by the formal transfer of the property, and at midnight of that date Thos. F. Murphine, superintendent of public utilities, assumed control for the city. At that hour 1200 conductors and motormen, and 600 other em-

ployes automatically passed from the payroll of the traction company to that of city. As has been stated before in these columns, the deal involved the transfer of 206 miles of track, 600 cars, several car barns, repair shops, warehouses and supplies, as well as real estate.

On recommendation of Superintendent Murphine, the City Council passed an ordinance adopting a wage scale for conductors and motormen, which allows $4.25 per day for the first six months, $4.50 for the second six months, and $4.75 per day thereafter.

The operating organization of the Traction Company, from Superintendent Henderson down, was taken over by the city practically undisturbed.

A. W. Leonard, president of the Puget Sound Traction, Light & Power Co., after the transaction had been closed and the property transferred, made a statement from which the following is taken:

"The city can do many things for the car lines that no private company could do, and which it could not very well do, perhaps, with the lines under private management. It can lower costs of operation by freeing itself from burdensome taxation. It can borrow money for extensions and development on better terms and at lower rates of interest than the company could with so many of its franchises approaching the time of expiration. It can pay dividends to its stockholders —the public—in service instead of money. It can reduce the cost of accidents and some of the costs of accounting and legal service through the co-operation of the other city departments. It can greatly facilitate operation by securing the co-operation of the street and police departments in the regulation of traffic. The city can eliminate unfair competition and adopt practices, like the skip stop, which will effect very material savings.

"Every fair-minded person realizes that the Puget Sound Traction, Light & Power Co. has always given the best service it could under the circumstances, and that it has done much for the city of inestimable value by its liberal policy of providing lines and extensions to outlying districts which have given Seattle one of the finest suburban developments to be found anywhere in the United States and which have made it freer from tenement house congestion than any other American city of its size or larger. The company made many extensions that proved to be a greater asset to the public than to itself. That no long extensions to the street railway system were made in the past few years was due to conditions over which the company had no control. We have seen the need, but the financial situation has not been such as to enable us to make further investments in the street railway property. In this respect the city will find that it has benefited itself by taking over our street railways. Before any extensions are made, however, a very careful study should be made to determine the financial results to be obtained by the additional expenditure required.

"The growing needs of a utility like a street railway system in a growing and expanding community like Seattle require constant supplies of new money. It is here that Seattle makes its greatest saving. Franchise obsolesence with us—that is expiring franchises —and the consequent uncertainty of the future compelled us to pay very much higher rates for money than the city will have to pay now that that uncertainty has been removed. The life of a franchise will no longer be a factor and the city will be able to obtain all the development funds it needs at the very lowest going rate.

"The responsibility resting on the man who has charge of the system is a heavy one and should have the co-operation of every city official."

PROGRAM OF FOREIGN TRADE CONVENTION.

Meeting to Be Held in Chicago April 24-26 Has Ambitious Program.

The forthcoming convention in Chicago will be the sixth held by the National Foreign Trade Council. The interests of every section of the country will be represented and the speakers will come from most of the important industries. America's need of foreign trade and the way to increase it and develop it upon sound, progressive and aggressive basis are the aims of the Council.

Part of the program is now made up and contains the names of many prominent business men who are to speak upon important subjects. F. I. Kent, vice-president, Bankers' Trust Co., will speak on "America's Financial Equipment for Foreign Trade"; Hugh Frayne, War Industries Board, will discuss "Interest of Labor in Foreign Trade"; William Pigott, president, Seattle Car & Foundry Co., will talk on "The Element of Labor Costs in American Exports," while Edward Prizer, president, Vacuum Oil Co., will deliver an address upon "The Effect of Increased Productive Capacity Upon Our Foreign Trade."

Post-war problems of foreign trade will receive consideration by the Hon. W. S. Culbertson, U. S. Tariff Commission, who will advocate "A Bargaining Tariff" to prevent discrimination against American goods in foreign markets. Hon. John M. Parker will speak on "The Mississippi Valley and Foreign Trade," and "Stabilizing Effect on American Industry of a Definite Foreign Trade Policy" will be the theme of J W. Hook, president, Allied Machinery Co. of America. Other important and timely subjects will be "Effect of the Restoration of Peace Upon European Trade Conditions," "The World's Merchant Fleets Today," "Future of the American Merchant Marine on the Pacific," "Relation of Law to the Successful Development of Our Merchant Marine" and the "Relation of Inland Waterways to Foreign Trade," "Meaning of Foreign Trade to the Middle West," "An American Maritime Policy," "Relation of Diplomacy to Foreign Trade" and "The Future of Our Foreign Trade."

An especially vigorous effort is being made this year to build up an efficient trade advisor service. It is realized that the delegates to the convention will want definite facts on a variety of practical problems. To supply these data, the services of a large number of Government experts and experienced business men have been obtained. If delegates will send the questions on which they wish to receive definite information to the secretary of the National Foreign Trade Council, he will see that advisors are in attendance who can supply the desired information. It is expected that this advisor service will prove to be one of the features of the convention.

ELECTRIC FURNACE ASSOCIATION HOLDS MEETING TO FURTHER ORGANIZATION.

On April 3 a meeting of the newly formed Electric Furnace Association was held at the Chemists' Club, 50 East 41st Street, New York City, at the call of President Acheson Smith, and a large number were

present. Reports of the various standing committees were made, and a tentative draft of the constitution and by-laws submitted. Resolutions were passed adopting the constitution as drawn for a temporary period until the new membership committee, which is to be created at once, can secure a representative list of members from the various industries interested in the work of the association. After such membership is formed, the draft of the constitution will again be considered and accepted in final form by the membership.

An aggressive campaign for membership will be undertaken at once, and all manufacturers of electric furnaces, electric-furnace supplies, power companies, manufacturers of electric steel, electric brass and other electric-furnace products, designers, inventors of furnaces, etc., will be invited to become members. An early meeting of the board of directors of the association will be held to go into further details.

NATION'S GEAR MAKERS TO MEET AT CLEVELAND.

President F. W. Sinram of the American Gear Manufacturers' Association announces that their annual convention will be held at the Hotel Statler, Cleveland, Ohio, April 14, 15 and 16.

The organization includes in its membership representative companies engaged in making gears in the United States and Canada and promises to be of unusual interest to the manufacturing world. For some years past the American Gear Manufacturers' Association has been striving earnestly to affect an organization that would develop definite means for standardizing their products. The coming convention will center its attention on this problem.

Papers will be presented as follows:

(1) "Gear Steels," by Dr. Parker of the Carpenter Steel Co.

(2) "Proper Sizes and Materials for Gears."

(3) "Worms and Worm Wheels," by a representative of the Timken-Detroit Axle Co.

Officers of the association are:

President, F. W. Sinram, of the Van Dorn & Dutton Co., Cleveland, Ohio.

Vice-president, H. E. Eberhardt, of the Newark Gear Cutting Machine Co., Newark, N. J.

Secretary, Frank D. Hamlin, of the Earle Gear & Machine Co., Philadelphia, Pa.

Treasurer, Frank Horsburgh, of the Horsburgh & Scott Co., Cleveland, Ohio.

COLONEL JUNKERSFELD TENDERED FAREWELL DINNER BY CHICAGO FRIENDS.

On Saturday evening, April 5, about 200 friends of Col. Peter Junkersfeld, assistant to the vice-president of the Commonwealth Edison Co., held a dinner in his honor at the Chicago Athletic Association. The occasion which prompted this affair was the departure of Colonel Junkersfeld from the Edison company after nearly 24 years of service to join the organization of Stone & Webster, Boston, Mass., as engineering manager. Colonel Junkersfeld recently received his discharge from the Construction Department of the Army where he was very active during the period of the war.

During the course of the banquet, which was presided over by Louis A. Ferguson, vice-president of the Edison company, several of those present paid glowing tributes to Colonel Junkersfeld. Among these were Britton I. Budd, president of the Chicago elevated roads, R. F. Schuchardt, electrical engineer of the Edison company, and W. L. Abbott, its chief operating engineer. After briefly reviewing "Our Pete's" connection and activities with the Edison company, Mr. Abbott presented him with a gold watch as a token of esteem from those present. In his reply, Colonel Junkersfeld thanked those present for their appreciation and gift.

LIGHTING FROM CONCEALED SOURCES EXPLAINED TO ENGINEERS.

At a recent meeting of the Springfield Engineers' Club, Springfield, Ill., J. L. Stair, chief engineer of the National X-ray Reflector Co., Chicago, gave an illustrated talk on "The Art of Lighting." The meeting was attended not only by members of the club but also by architects of the city. After a general discussion of the various aspects of modern lighting, special emphasis was placed upon illumination of interiors without the use of ceiling fixtures, as one of the latest developments in lighting.

In this system, all hanging ceiling fixtures are abolished and lights are placed in coves, on brackets extending from pillars or sunk in wall pockets. These methods are being applied extensively in churches, banks, stores and other interiors where indirect illumination is wanted and where hanging fixtures would be out of place or for particular reasons can not be employed. This system is applied in the home in the form of indirect lighting portable lamps. The principal talk of the evening was illustrated by a large number of lantern slides, supplemented by a demonstration in color lighting, and was followed by an explanation in simple terms of how light is measured.

REDUCING THIEVING FROM PREPAY METERS.

The Georgia Railway & Power Co. has overcome financial losses due to the robbery from prepayment meters in vacant houses on its system by assigning special men to the work of emergency collecting the deposits in prepay meters. Men are assigned to the special work of collecting the deposits from vacated prepay meters within a very few hours of the time the tenant informs the company they are vacating the premises. Usually the deposits are taken out the day before the outgoing tenants leave. Formerly 48 hours' notice was required by the company. Now one hour's notice suffices. The company finds that by this means it saves money and considerable trouble as well.

MR. STICKNEY DISCUSSES INDUSTRIAL LIGHTING CODES.

On April 11 a joint meeting of the American Institute of Electrical Engineers and the Illuminating Engineering Society was held in the Engineering Societies Building, New York City, at which George H. Stickney presented a paper on "Present Status of Industrial Lighting Codes." A report of this meeting will be given in our next issue.

For the benefit of engineers and state authorities in the Central West, Mr. Stickney will present the same paper at a joint meeting of the Chicago sections of the A. I. E. E. and I. E. S. to be held in the rooms of the Western Society of Engineers, Monadnock Block, Chicago, on the evening of April 17.

Commercial Practice

Brooklyn Edison's House-Wiring Campaign—New York Edison Greets Returning Troops—Large Federal Cotton Mill

NEW HOUSE-WIRING CAMPAIGN UNDER WAY IN BROOKLYN.

Plan for Electrifying Old Houses Under Way.

Beginning April 1, the Brooklyn Edison Co. resumed its house-wiring campaigns on already-built houses in Brooklyn, N. Y.

The Brooklyn plan of electrifying old houses has worked out most successfully in the past, securing for the central station many thousands of residences along its existing mains.

The rejuvenated plan presents a schedule of prices for the wiring of one room, one floor or the entire house, and includes fixtures, glassware and Mazda lamps. A very liberal partial-payment feature is offered, with payments as low as $2 a month, extending over a period of 12 months, if desired.

A new set of fixtures of the Adam design has been selected which it is expected will make the Brooklyn Edison plan more attractive and salable than ever before.

The soliciting for this class of business is done entirely by the Edison salesman, but the actual work of installation is performed by the electrical contractor designated by the customer.

This method of awarding contracts has worked out most satisfactorily to all concerned and all the Brooklyn contractors have again signified their desire to co-operate with the company in the same manner as heretofore.

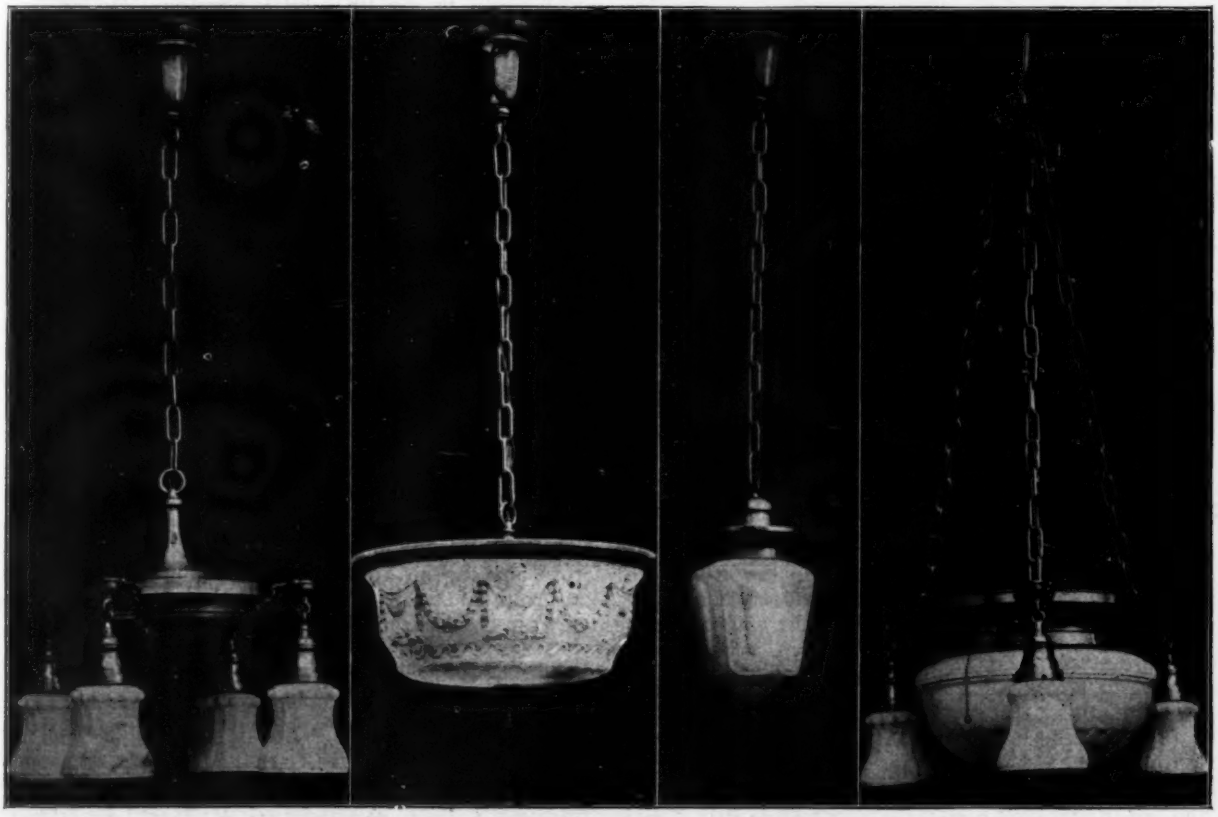
The features of the new plan are fully explained in a new booklet entitled the "New Edison Wiring Plan," which shows cuts of the fixtures and gives the detail of the cost of wiring and the partial-payment offers.

The following schedule gives the prices adopted and are for single apartments and residences along the commercial mains of the company:

No. 1, Kitchen.—Ceiling outlet with one-light fixture, pull-chain socket, 50-watt tungsten lamp, shade and a baseboard or side-wall flush receptacle, located in kitchen on the first floor, $21.45.

No. 2, Cellar.—Ceiling receptacle with 50-watt tungsten lamp located in cellar near heating apparatus operated by a flush switch at head of cellar stairs, $11.90.

No. 3, Dining Room.—Ceiling outlet with three-



Types of Fixtures Used in Brooklyn House-Wiring Campaign.

light shower fixtures, center switch control, shades and 50-watt tungsten lamps, $17.80. (No. 3a—If combination bowl and shower fixture is desired instead, add $2.75.)

No. 4, Parlor.—Ceiling outlet with four-light shower fixture, center-switch control, shades and 50-watt tungsten lamps, $16.90.

No. 5, Library.—Ceiling outlet with 15-in. bowl fixture, two lamp sockets, and 50-watt tungsten lamps operated by a center control switch, $17.

No. 6, Main Hall.—Ceiling outlet in hall with one-light chain fixture, pull-chain control, shade and 50-watt tungsten lamp, $12.60. (If wall bracket is desired instead, deduct $3.15.)

No. 7, Bedroom.—Ceiling outlet with two-light shower fixture, center-switch control, shades and 50-watt tungsten lamp, $12.50.

No. 8, Piazza.—Ceiling outlet on piazza with ceiling fixture, 50-watt tungsten lamp and ball shade, switch located in hall, $15.

No. 9, Bathroom.—Side-wall outlet, one-light nickel-plated fixture, pull-chain socket, shade and 50-watt tungsten lamp, $8.45.

No. 10, Pantry.—Side-wall outlet, one-light bracket fixture with pull-chain socket, shade and 50-watt tungsten lamp, $8.30.

No. 11, China Closet.—Side-wall outlet, one-light bracket fixture with pull-chain socket, shade and 50-watt tungsten lamp, 8.30.

No. 12, All Other Outlets.—Other lighting outlets, one-light bracket fixture, pull-chain socket, shade and 50-watt tungsten lamp, $8.30.

No. 13.—Two three-way switches for controlling hall light from upper and lower floors, $15.85.

No. 14.—Baseboard, wall and ceiling receptacles, each $7.15.

No. 15.—Floor receptacles, $9.90.

No. 16.—Bell-ringing transformers for alternating current only (this device does away with all trouble and expense of dry and wet batteries), $1.90.

No. 17.—Single-pole flush wall switches, each, $7.15.

No. 18.—For running risers through additional floors in houses of more than one family add $7.15 for each floor above the first floor. (In this schedule the floor above the cellar is considered the first floor.)

Deductions for fixtures if personal selection is desired: No. 1, $2.30; No. 3, $9.20; No. 3a (bowl and shower), $11.95; No. 4, $10.35; No. 5, $10.45; No. 6, $4.90; No. 7, $5.95; No. 8, $1.15; No. 9, $1.90; Nos. 10, 11 and 12, each, $1.75.

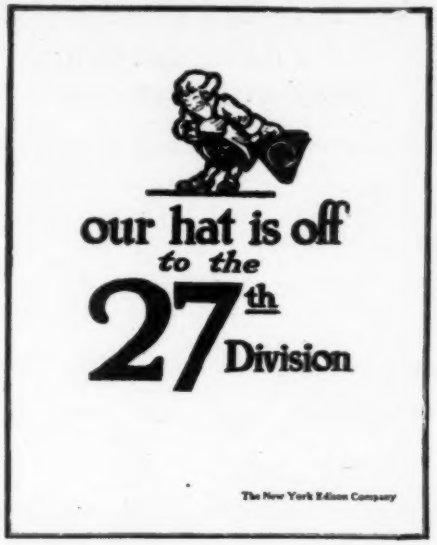
NEW YORK EDISON COMPANY GREETS THE TWENTY-SEVENTH.

Company Uses Newspaper Advertising Space to Greet Famous Regiment.

The progressive policy actuating the New York Edison Co., New York City, leads to the utilizing of every opportunity to advance the welfare and interest of the community, indicating at the same time the enterprise and commendable spirit in public affairs which pervades the organization. And so, when the Twenty-seventh army division was announced to parade in New York on March 25, closely following its return from France, the company used its usual daily newspaper space immediately preceding the event to greet the members of this famous army section which did so much to break the Hindenburg line.

A specimen of the announcements as printed is shown in the accompanying illustration. This advertisement, about 6¾ by 8 in. in size, employs the characteristic Edison man to novel and interesting advantage. The copy is clever and so brief that it can be caught at a glance, and with plenty of white space to help the display. The entire announcement does credit to the advertising department of the company.

One might say that such an advertisement doesn't



go far to sell electric energy—and yet the reverse may be true. It makes the reader think of the New York Edison Co.; it makes one appreciate that there is something behind the utility company beyond the mere promotion of its own interests—that the spirit of patriotism is there. These thoughts are builders of good will and influence, and most valuable assets for the development of sales possibilities.

ELECTRICALLY-OPERATED COTTON MILL FOR ATLANTA PRISON.

Federal Convicts Will Make Duck Cloth for Mail Bags in Model Mill.

One of the most modern cotton mills in the entire South will start operations shortly behind the walls of the federal prison, near Atlanta. Uncle Sam will go into the manufacturing business with convict labor to make cotton duck cloth for mail bags in time of peace, and if war ever comes again to make canvas for the army. The mill will be operated with electric power supplied by the Georgia Railway & Power Co.

Five hundred looms will be installed. They will be operated by 292 1-hp. motors and 208 ½-hp. motors. There will be approximately 74 twister frames with 12,000 twister spindles, operated by 74 15-hp. motors, making an aggregate connected load in motors approximately 1800 hp. The Government will buy yarn in the open market.

Prison labor will be utilized in the textile department, working eight hours per day. It is expected that the present-day requirements of the Government will not necessitate the working of additional shifts at this time.

The mill building is 470 ft. long by 270 ft. wide, of reinforced concrete and of the most up-to-date type of construction. The latest approved method of daylight illumination is employed.

Operating Practice

Useful Structural Arrangement—Paralleling Regulator Precaution—Transformer Load Record—Metal for Slip Rings

PROTRUDING REINFORCING USED FOR HOISTING PURPOSES.

Simple Expedient Offers Many Advantages for Rapid Lifting.

The accompanying illustration shows a simple expedient adopted by the Northern States Power Co. in one of their new stations. The innovation aims to permit fairly heavy objects to be lifted easily without the expense of having had a crane installed.

In many cases, for example, on the chamber containing the mechanisms of large circuit breakers, it is occasionally necessary to move a switch mechanism to make repairs or an inspection, but in the ordinary way a mechanism once installed may be expected to remain undisturbed until some radical change occurs. Where much lifting is to be done a traveling crane is justified. Where such lifting will be only sporadic and unlikely, the investment in a crane is not justified

Use of Reinforcing Steel Bar for Hoisting Purposes.

because of the expense. In these cases anything that tends to simplify moving equipment and reduce the time of doing it is worthwhile when its cost is low.

The accompanying illustration shows a method employed by this middle-west company to enable their construction gang to readily handle the mechanisms of the large circuit breakers in the switch gallery. When the switch house was built an additional reinforcing rod was installed, as shown. The section of the rod protruding through the ceiling enables the block and tackle to be hitched to it, simplifying lifting. This same method could be used, somewhat modified, for lifting transformers and similar apparatus that requires being lifted for inspection and repair.

PRECAUTION IN PARALLELING INDUCTION FEEDER REGULATORS.

Checking Rotor Position Against Voltmeter Indication Advocated.

By M. S. Acres.

In densely populated territories where circuits overlap to some extent, it is customary to install emergency ties to permit paralleling circuits, and cutting over a circuit to some other circuit in the same station or even a different station. For making station repairs it is also a practice of some companies to interchange feeders and feeder regulators, carrying two circuits on one set of regulators or using a spare set of regulators while inspecting or repairing those that are normally employed with a circuit.

In carrying out the switching involved in the above, that is in paralleling two induction regulators until the load can be transferred from the one to the other, certain precautions must be observed, because failure to observe them may result in deranged service and damaged apparatus.

In paralleling regulators, the all-important thing to bear in mind, presuming, of course, that the two circuits are in synchronism and in phase, is that there exist equality of voltage. That is to say, if paralleling two regulators in the same station, their rotors must be in the same relative position so that the voltages on the line or regulated side are the same. This matter is not so important where tieing-in two circuits through different stations or over long feeder lengths, since line drop between the two regulators tends to prevent heavy current rush.

Equality of voltage is usually judged by checking the voltage on the line side of the regulators. And when the voltmeters indicate the same voltage, the regulators are paralleled. This method is open to criticism, however, because station voltmeters may sometimes give a wrong indication on account of the calibration of one or of both instruments being "off" due to sticking, bent pointer and similar causes of error. Using the voltmeters to give a rough indication as to the line voltage is satisfactory, but a station operator should check up the indications of his instruments by noting the relative position of the regulator rotors. This can easily be done by looking at the position of the quadrants.

In one instance that came to the writers notice. a voltmeter had become defective. The operator failed to check up the relative position of the rotors of the regulators to be paralleled, depending upon the voltmeters. The regulators were paralleled when at unequal potential with the result that one regulator was wrecked, the regulator cover being broken, the windings damaged and the unit made useless until extensive and expensive repairs had been made. It is advisable, therefore, to check up the position of the rotor as well as voltmeter readings before paralleling feeder regulators.

DISTRIBUTING TRANSFORMER SERVICE RECORD.

Type of Card Maintained by Toledo Railways & Light Company.

The form of transformer records maintained by a central station or distributing company may play an important part in deciding upon the service rendered as a whole. For example, lack of a sufficiently accurate transformer record may cause endless trouble when it comes to replacing a transformer that has failed, if it is necessary to send a man out to the pole to find out the type and rating of the unit in trouble. Moreover, in paralleling units in three-phase banks

and for single-phase loads, it is important that the units have the same voltage ratio, and preferably the same relative inductances and resistances, especially with low power-factors.

Order No. ..... **TRANSFORMER RECORD** Company No. .....

Make ..... Ser. No. ..... Type ..... Form ..... % Taps ..... Phase ..... Size Kva. .....

Pr. Volts ..... Sec. Volts ..... Date Purchased ..... Cost (F.O.B.) ..... $ ..... Cost (Toledo) $ ..... Cycles .....

INSTALLED							REMOVED		
Date	W.O.No.	LOCATION	Pole No.	Ser.	Banked With	Con. Voltage	Date	W. O. No.	Reason

LOAD RECORD (Facing Transformer)

Date	Time	VOLTS		AMPERES		K V. A.			CONCTED K. V. A.	RATIO Con. Test	REMARKS
		Across	Right	Left	Right	Left	Right	Total			

Condemned and Characteristic Test Record—On Other Side

Distributing Transformer Record, Toledo Railways & Light Co., Front View.

A transformer record should contain not only information as to the location of the transformer, its size, ratio, service, etc., but also the work orders under which they were installed and taken down. Tests to determine operating characteristics, whether made before or after installation are also often the means of determining the condition of a transformer without loss of time.

The accompanying illustrations show a form of transformer record used by the Toledo Railways & Light Co. Fig. 1 shows the front side of the record card, Fig. 2 the reverse side. Information such as reason for burn-outs, breakdowns, grounds, loads, etc., as determined from inspection or investigation, are recorded under "Remarks."

CHARACTERISTIC TEST RECORD

INSULATION TEST			EXCITING CURRENT		EXCITATION LOSS		REMARKS	By	Date
Pri to Sec.	Pri to Case	Sec. to Case	Volts	Amperes	Core	Copper			

SOLD

Date ..... Value ..... Sold to ..... Condition .....

Distributing Transformer Record, Toledo Railways & Light Co. Back View.

CHOICE OF METAL FOR SLIP RINGS.

The composition of the material used for the slip rings of electrical machinery has an important bearing upon the behavior of the brushes, says P. Hunter-Brown in his paper on "Carbon Brushes," read before the I. E. E.

Many mixings have been tried and doubtless there is little to choose between several, but it may be mentioned that Admiralty gunmetal (88% copper, 2% zinc, 10% tin) has been found excellent in every way. Steel is used sometimes for turbo-alternator rings and occasionally malleable iron for induction motors These metals possess marked disadvantages. Their thermal conductivity is lower than that of bronze, with the result that the heat generated at the contact surface of the brushes is not so readily conducted away. Also, even when clean, the contact drop with iron or steel is some 30% greater than with bronze. The rings tarnish very readily if left standing for a short time, and the contact drop is then still further increased. Moreover, the tarnish is not uniformly distributed round the ring owing to certain parts being covered by the brushes when the machine is at a standstill, with the result that "flats" are very apt to develop.

If the current to be collected is large, low contact drop becomes of special importance, and in order to secure this a highly metallic grade must be chosen if all-round satisfactory results are to be obtained.

Contracting-Construction

Chicago House-Wiring Activities—New Oregon Licensing Law—Effective Campaign Folder — Motor Repair Shop

OLD HOUSE WIRING BEING ACTIVELY CARRIED ON IN CHICAGO.

Remarkable Results Obtained in This Work During March—New Co-operative Committee Gives Assistance.

Those electrical contracting companies of Chicago that are engaged in the wiring of existing buildings apparently have not waited for the opening of the National house-wiring campaign to commence activities in this work. While no intensive or co-operative campaign has been promulgated, the individual contractors have been busily engaged in promoting this work during recent months and especially during March when as a result of their activities a total of about 1500 houses and apartment buildings were wired.

This success, however, is not expected to interfere in any way with the results to be obtained during the campaign period but are rather a preparation that the contractor may show even better results during the campaign. There are still plenty of buildings in Chicago which are not equipped for electric service as well as a large number in which the wiring is inadequate and in poor condition. As the present building shortage gives the modern building additional value a great many of these old buildings will be rewired. Furthermore, April and the first part of May, the time of the National Campaign, are the real house-cleaning months and a great many house-wives who have put off having their homes wired until this time are expected to have it done then. This fact, borne out by the figures thus far obtainable indicates that the results for March will be greatly surpassed by the results to be obtained during the campaign.

The Commonwealth Edison Co. has been especially active in this work and during March, doubled the amount of business in this line over that done in February, which in turn was double the amount done in January. The house wiring done by this company in March amounted to $63,000, including wiring and fixtures. A total of 222 residences and 454 apartments having a combined load of 10,336 50-watt, equivalent, lamps were wired. In these buildings, 310 convenience service outlets were installed.

Among the other Chicago contracting firms which were very active during March in this work are the following: Dempsey & Meade, Cody Electric Co., Lewis Electric Co., Sam. Garvin & Co., Calumet Electric Co., B. O'Hare, O. R. Martin, and the Emergency Electric Co.

The newly organized co-operative committee of Chicago contractors and the Commonwealth Edison Co. has been very active in smoothing out many of the former difficulties which arose between these interests and this has stimulated the house-wiring activities to a considerable extent. This committee, assisted by A. F. Bromwell, of the inspection bureau of the Edison company, recently developed a new plan to facilitate the prompt connection of new installations to the company's lines. Considerable difficulty has been experienced from this source in the past by customers and contractors which was particularly marked in the case of the wiring of old buildings where gas lighting was being replaced. This trouble arose from several sources, the chief ones being—neglect on the part of the customer to make the necessary application for service, the inability of the company's representatives to keep in close touch with every job, and loss of time in notifying the contractor when any trouble or mistakes were discovered due to the difficulty often found in locating the contractor. The trouble was further complicated by the fact that inquiring contractors and customers were frequently confused by not having any one department from which to obtain information concerning the various jobs.

According to the new plan the contractor on receiving an order will immediately call the inspection bureau and notify one of the men who have been detailed to follow this work, of the name and address of the prospective customer, when he expects to start work on the building and any other information which he may have concerning the job. The man in the inspection bureau will notify the contract department to secure the necessary application, look after transformer capacity and make other preliminary arrangements and notify the district inspector of the time when he should call at the building.

The contractor, on starting the job, completes the installation of the service conduit and wires before doing any of the interior wiring which allows the company's inspector to order the service drop installed. As soon as the fixtures are installed the inspector makes the final inspection and co-operates with the contractor in securing the certificate of inspection from the city inspector in order to install the meter. As a result, the inspector is saved any unnecessary trips to the building and the customer is usually given service within a short time after the job is completed.

NEW OREGON LAW PROVIDES FOR LICENSING ELECTRICAL CONTRACTORS.

Law Also States That Rules of Bureau of Standards Shall Be Followed in Future Installations.

The state of Oregon recently enacted a law to prescribe the manner of installation of wires and equipment to convey electric current and of electric apparatus to be operated by such current and requiring persons, firms or corporations engaged in electrical contracting business to obtain a license and furnish a bond. This law will become effective May 29, 1919.

This law provides that all installations in the state of Oregon, from and after that date, of wires and equipment to convey electric current and all apparatus to be operated by such current shall be made in substantial accord with the rules laid down by the Bureau of Standards relating to such work so far as these

rules cover both fire and personal injury hazards. However, this law does not apply in incorporated cities and towns which by ordinance or building code prescribe the manner in which the installing of electric wires and apparatus shall be done. Provision is also made whereby the latest compilation of rules by the Bureau of Standards in effect on July 1 each year shall be considered the rules as laid down by the law for the coming year. In this way any changes in the Bureau of Standards Code are incorporated in the law.

The law also provides that all persons, firms or corporations engaged in the business of installing electric wires or equipment shall be required to obtain from the Commissioner of Labor and Inspector of Factories a license to do such work on or before July 1 of each year. The applicant is required to pay an annual license fee of $15 and shall have executed a bond of $500 running to the state of Oregon. This bond to be conditioned that the principal will make all electrical installations in substantial accord with the rules of the Bureau of Standards or with the local rules of the individual town or city and that the principal will pay all labor and material claims upon such work and all damages sustained arising from failure to make such installations.

The enforcement of this law is placed in the office of the Commissioner of Labor and Inspector of Factories and Workshops. All necessary expenses incurred in the carrying out of the provisions of this act shall be paid out of the funds collected in license fees. The law also provides that violation of the law constitutes a misdemeanor and is punishable by a fine not to exceed $100.

The licensing provisions of this act do not apply to those engaged in the business of making or selling electricity in connection with the construction or maintenance of lines or wires for the transmission of electricity, nor in installing or repairing on the premises of customers service connections, meters or other apparatus used in the measurement of electricity by such customers, nor to work in connection with street or public lighting. Neither do they apply to those who make electrical installations used in their business on their own property or to those installing, maintaining or repairing apparatus or wires for making or distributing electricity upon the premises or property owned or managed by them, nor to persons engaged in the business of installing or repairing ignition or lighting systems for motor vehicles or to telephone companies.

EFFECTIVE ELECTRIFY-YOUR-HOME ENCLOSURE FOR HOUSE-WIRING CAMPAIGN.

In its nation-wide house wiring campaign, "Electrify Your Home," inaugurated on April first, the Society for Electrical Development, Inc., is co-operating with the industry everywhere, as well as with the Government, which is advocating the immediate building and remodeling of homes.

"Own your own home," says Uncle Sam, "Build and Electrify Now!" And the society is working with the industry to help "do it now!"

Included in the material issued by the society to aid dealers and contractors is a small folder entitled "Uncle Sam Says Electrify!", in which the process of wiring an old house is described and illustrated in such a way as to make it perfectly clear to the woman whose home may be electrified. This folder, attractively colored, and showing on the cover a picture of Uncle Sam holding out an electric lamp, tells how simply and "dirt-lessly" an old house can be made new by electrifying it. It also contains cuts showing the wiremen at work.

This folder is supplied to house-wiring campaigners with other dealer helps in a portfolio which contains the whole story and the "how tos" of successful house-wiring campaigns. The Society reports that over 5000 colored window displays have been sent out to electrical contractors, dealers, and the central stations.

LARGE MOTOR REPAIR SHOP OPENS IN OMAHA.

States Electric Service Co. Provides Every Facility for Giving Good Service.

The States Electric Service Co. announces the opening of what is perhaps the largest electrical repair shops west of Chicago at 1011 Farnam street, Omaha, Neb. This shop is completely equipped with all up-to-date machinery for repairing and rewinding motors, generators, controllers and electrical power equipment. An extensive electrical contracting business will also be carried on and a complete line of alternating and direct-current motors and controllers will be carried in stock for sale. In addition, a large stock of materials and spare parts of all kinds will be kept on hand which will be a great advantage and benefit to its customers. In the construction of the new shop no expense was spared that will improve the facilities for giving the users of electric power in Omaha and the surrounding territory the best possible service and enable it to handle any kind or make of apparatus regardless of size.

CHART SHOWS EFFICIENCY OF CHICAGO'S ELECTRICAL INSPECTION.

Number of Electric Fires per 100,000 Lamps Reduced from 1.8 in 1910 to .6 in 1917.

The value of adequate and efficient inspection of electric wiring and apparatus is clearly shown by the curve in the accompanying chart. The curve shows the number of fires of electric origin in Chicago per 100,000 incandescent lamps in service from 1910 to 1917. It was drawn by Victor H. Tousley, chief electrical inspector of the Department of Gas and Electricity of that city.

The gradual downward trend of the curve from 1.8 fires in 1910 to .6 in 1917 in spite of the extraordinarily large number of lamps which were added during this period is substantial proof of the thoroughness of the Chicago inspection authorities and the practicability of their code.

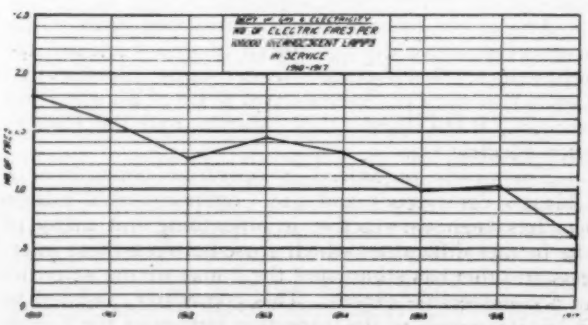


Chart Showing Number of Electric Fires in Chicago per 100,000 Electric Lamps.

QUESTIONS AND ANSWERS

All readers are invited to submit questions and answers to this department. Anonymous communications will not be considered. Questions should relate to electrical matters of any kind. Answers contributed by readers should be submitted preferably within eight days at the date of publication of the question and should be limited, if possible, to 300 words. Payment will be made for all answers published.

Questions.

No. 458.—Penalty for Low Power-Factor.—Where a power contract with a central station includes a penalty for low power-factor, what means are commonly used to check up on what the average power-factor actually is? Do any power companies make an annual or semi-annual survey of their power customers, or at least the larger ones?—S. W. Q., Allentown, Pa.

No. 461.—Approved Stands for Flatirons.—Rule 25*d* of the National Electrical Code requires that smoothing irons, sadirons and other heating devices that are to be applied to combustible articles must be provided with *approved* stands. What is the most practical means for enforcing this rule? Should it be called to the attention of all dealers in these irons and they be compelled to sell stands with the irons, or should inspectors be expected to visit all places where flatirons are used and insist on the use of suitable stands with the irons?—E. A. M., Oak Park, Ill.

No. 462.—Electric Welding of Rails.—Is there a definite dividing line between spot and arc welding as to where one would be used and not the other, or does their utility overlap to a certain extent? I refer especially to the welding of street-car rails, for which both methods seem to have been used. Which method is preferred for this work?—T. N., Toledo, Ohio.

Answers.

No. 457.—High-Speed Grinder.—We wish to run an internal grinder at a circumferential speed of 5000 ft. per minute. As the wheel is only 2 in. in diameter, it would have to run about 10,000 r.p.m. What is the most practical way of getting this speed?—H. D., Detroit, Mich.

Answer A.—The tendency toward making high-speed internal grinders of a portable nature is very pronounced and seems to be meeting with success. Where a stationary grinder, to which the work must be brought, is set to run at a certain speed, its usefulness is sometimes limited, and when there is need for internal grinding this often is out of the question. Again most internal grinders run with small wheels attached and must of necessity be run at a very high speed, from 10,000 to 50,000 r.p.m. And it is for such use that the portable internal grinder is a necessity wherever such work is handled. This enables the opertaor to attach his grinder on the machine in which or on which the work to be ground is situated and with it he can do very accurate work. The "Dumore" high-speed grinders are very useful and can probably fill the bill. Of course, it will depend entirely on whether the grinder in question is of a stationary or portable nature. However, for internal grinding in a great many instances the portable grinder is the most practical and they can be purchased with speed ranges from 10,000 to 50,000 r.p.m.—W. T. E., Ansonia, Conn.

Answer B.—Without having at hand any definite data regarding how the grinding apparatus in question is to be used, it is a difficult matter to give any one solution which will answer all purposes. Of late, it has become the practice to mount such a machine on the lathe carriage and to use it for such purposes as the job in hand may require. Such a device, designed to operate at high speeds, may be constructed, but in the opinion of the writer much more satisfaction can be obtained through the purchase of such a device, several of which are on the market. A motor known as the "dental engine," developing from 1/6 to 1/3 hp. (two sizes) at from 2000 to 4500 r.p.m. would be ideal for this purpose as its speed can be regulated through a wide range by means of a rheostat. This high-speed shaft carrying the wheel should be equipped with long bearings of either the ball or roller type, which should be mounted either upon the back of the motor or upon separate brackets which should be mounted upon a common base with the motor. This shaft as well as the bearings should be of a size which would insure constant operation without excessive heating. Assuming the maximum grinding speed is to be obtained at maximum motor speed and allowing a 2-in. pulley for the driver pulley, the driving or motor pulley would be approximately 4.5 in. Both pulleys should be grooved and fitted with a round metallic belt of the endless type in order to stand the excessive wear due to high rate of travel. Great care should be exercised in keeping the pulley centers at a distance which will allow sufficient belt surface.—W. F. P., Atlantic, Mass.

Answer C.—For speeds of 10,000 r.p.m. a well-balanced motor with liberal ball bearings can be so designed as to be sufficiently rigid to serve for very accurate grinding. With a ball-bearing auxiliary spindle attached to the motor and driven therefrom by friction or a leather belt, speeds from 20,000 to 50,000 r.p.m. of the spindle may be obtained. Grinders of this type are manufactured by the Wisconsin Electric Co., of Racine, Wis. It is not thought advisable to refer to design data or submit calculations or sketches for making such high-speed devices, since it is much cheaper to buy machines than to attempt their manufacture with the usual machine-shop facilities. The grinders the writer has in mind cost only from $40 to $95, depending upon the equipment.—H. E. W., Chicago, Ill.

No. 459.—Lighting for Beamed Dining-Room Ceilings.—In quite a number of apartments that we wired several years ago I find that the lights installed on the beamed ceilings of the dining rooms are seldom or never used. Usually these consisted of four rosettes at the intersections of the beams around a central rectangular panel, each outlet being equipped with a socket husk. Is the non-use of these lights due to decreasing popularity or fashion, or is there something about the installation that can be improved to make these lights more useful? Before ceasing to recommend wiring for such lights we should like to hear some opinions on the subject.—F. T. B., Milwaukee, Wis.

Answer A.—The current practice in the finer beamed and wainscoated rooms is to follow the old colonial plan of using brackets altogether, many designers depending altogether on portable candelabra to light the individual tables in dining rooms. The present facility in getting suitable portable fixtures to suit almost any requirement of taste has revolutionized the wiring of old colonial houses with their low ceilings and consequently the modern copies of this style of architecture, many such houses depending on baseboard receptacles alone. One of our oldest historic landmarks is wired in this way and it is ideal for the condition. The ceiling lights and fixtures described in the question are, in our section at least, 15 or 20 years behind the practice, in the writer's opinion.—B. R. B., Philadelphia, Pa.

Answer B.—In recent years it has become quite the practice to dispense with all lighting effects which are not of any great amount of value. While the

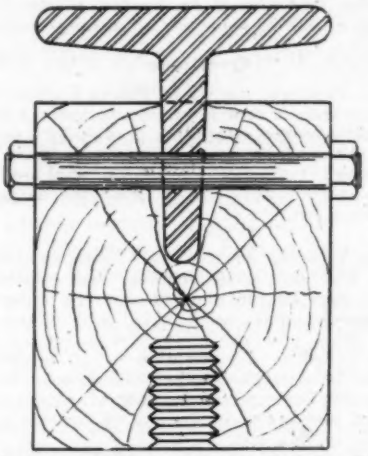
lighting method mentioned under this question is used quite extensively in the western parts of the country, little or none of it is used in the East. In this part of the country it was quite customary to install wall brackets on the breastwork over the fireplaces. This was considered, however, more for ornamental than for useful purposes and therefore these were little used except perhaps as a night light or during some special social gathering. For general lighting they were practically useless. Owing to this fact, more attention has been given to the central lighting effects both in regard to usefulness and economy, thereby giving greater satisfaction in every way. —W. F. P., Atlantic, Mass.

Answer C.—One of the reasons why such beam lights are not much used is that the public is not yet accustomed to having variety in lighting. The ordinary resident is content with either a dome or shower fixture over the dining table which he occasionally also uses for connecting up table appliances. He would not be averse in many cases to having not only the center fixture, but also the beam lights, some brackets at the sideboard and one or two baseboard outlets. He is not yet fully educated to the value of varied lighting effects and to the need for convenient appliance outlets. Moreover, the practice of central stations of basing his demand or primary current charge on a definite percentage of the number of outlets discourages installation of more than the absolutely essential minimum number of sockets in any room.—H. B., Chicago, Ill.

No. 469.—Rails Instead of Trolley Wires for Traveling Cranes.—I should like to know what experience is obtained from using light but fairly rigid contact rails in place of trolley wires for a traveling crane of large lifting capacity. Has this scheme been used to any extent? What method of supporting is used for the rails? Is it better to use sliding contact shoes or trolley wheels?—T. N. J., Akron, Ohio.

Answer A.—Steel rails have been and are now largely used in many well managed plants in preference to copper wires as contact conductors for traveling cranes. Although in most cases the installation of steel contact conductors would be more expensive than that of copper conductors, the steel in the long run will, probably, be the more economical because of its reliability. The steel conductors do not break as do copper conductors of the sizes ordinarily used. This element of continuity of service is of great importance. This situation is covered in some detail in the writer's "American Electricians' Handbook," on page 525 of which are shown details of a steel-contact-conductor system. The writer prefers a shoe to a wheel for connecting to steel contact conductors, for the reasons outlined in detail in the Handbook.—Terrell Croft, St. Louis, Mo.

Answer B.—It is now almost universally the custom in steel mills to use contact rails or bars in place of trolley wires on all electric cranes of the traveling bridge type. The trolley wires when subjected to the severe jars and vibrations on the traveling machinery are apt to become loose or stretch and sag and there is danger in not only making improper contact with the trolley wheel but also of the wires getting together and causing a short-circuit or a ground. Therefore, the contact rail has come into use. Various shapes of contact rails are used. One firm uses a square bar, another a small industrial railroad rail, another a tee bar and still another an angle bar. The tee bar and the angle bar with the contact shoe riding on the wide flat surface offer a rail easy to mount and giving a large contact area, which means less arcing and more uniform wear on the shoe. These are mounted on porcelain insulating blocks or in some cases impregnated wood or asbestos lumber. One method of mounting the tee bar rail is shown in the accompanying sketch. In the case of very large currents or long distances of travel, such as, for instance, the collector rails for an ore bridge, it is customary to use a standard lightweight railroad rail. To determine the proper size contact rail to use for a given installation, a safe



One Method of Supporting a Contact Rail for Crane—A Tee Bar Is Used with Impregnated Wood Insulators.

rule to follow is to choose a rail having a cross-sectional area of at least eight times the area of the copper conductor necessary to carry the same current. It is possible, however, to use even a smaller rail than that obtained by using the above formula and obtain satisfactory results.

In most cases where contact rails are used it is also customary to use sliding contact shoes in place of trolley wheels. This makes a simpler arrangement, reduces the wear all to one place, namely, the face of the shoe, and gives a larger area of contact. Because of the larger area the pressure per square inch is less, so that the wear on the sliding shoe is not excessive.—P. S. J., Pittsburgh, Pa.

Answer C.—It is common practice in the construction of large-capacity traveling cranes to use an angle iron for trolley contact, using a flat shoe for collector. In several of our new shipyards on the Delaware river, Terry & Tench 25-ton cranes use the rail and a 60-ton Heyl & Patterson crane uses the rails in a slotted channel under-ground. They must be satisfactory, as new ones of the same type are being added. The ones I saw or had any experience with are of the angle shape with about 2 in. surface for the shoe and are of steel fastened to supporting structure or walls with insulators. The shoes are flat brass, not of the trolley type, with springs to help maintain contact.—B. R. B., Philadelphia, Pa.

RATES FOR ELECTRIC SERVICE DURING CONSTRUCTION.

In the answer to question No. 455, on rates for electric serviced uring construction, contributed by W. H. Knutz, of Evanston, Ill., in our issue of March 22, 1919, an important section was omitted. It is as follows: "The charges for connecting and disconnecting may be either on contract price or on a time-and-material basis. In case of doubtful accounts a deposit may be required." This makes more clear the argument Mr. Knutz wished to convey.

New Appliances

Exceptional Lengths of Submarine Cables — Batteries for Farm Tractors—High-Voltage Generators for Radio Service

Two Unique Submarine Cables for Government Service.

The cable industry of this country is proud of many achievements in the manufacture of electrical communication and power transmission cables of exceptional size, length or other features of construction. There has come to us word of the production of two submarine cables that are believed to be quite unique, however, and of which brief mention should prove of considerable interest. These cables are being made by the Habirshaw Electric Cable Co., Inc., New York City.

One cable is for the United States Coast Guard Service and consists of two conductors, each made of 7 strands of No. 18 B. & S. gauge copper wire, insulated to 10/32 in. with 30% Para rubber and taped. The two insulated conductors are twisted together with paraffined jute fillers, then taped, covered with a serving of jute, armored with No. 6 Birmingham wire gauge galvanized-iron armor, and finally served with jute and asphalt. The cable is a little over 1½ in. in diameter and weighs 2610.8 lb. per 1000 ft. The particular feature of this cable is that it must be delivered in one continuous length of 30 miles, which means a weight of 413,000 lb.

The other cable is being made for the Government of the Philippine Islands. It is a single-conductor cable made of 7 strands of No. 20 B. & S. gauge copper, insulated to 9/32 in. with 10% rubber compound, taped, served with jute, armored with 0.092-in. galvanized-iron armor, over which is a serving of jute and asphalt. The diameter of this cable is approximately one in. and its weight 796 lb. per 1000 ft. A total of 200 miles of this cable is being made, which is to be delivered in four lengths of 50 miles each, so that each length will weigh over 210,000 lb.

Making of cables of such lengths is quite exceptional and involves serious production problems, which are being met in a satisfactory way, however.

Exide Tractor Type Batteries.

With the remarkable growth of farm tractors, it is not surprising that there should have arisen a demand for electrical starting, lighting and ignition equipment. Passenger automobile batteries were tried, but because of the abnormally hard service proved unsatisfactory. This unfortunately has resulted in a rather general feeling among tractor engineers that storage batteries will not stand the severe conditions encountered in this service.

The Electric Storage Battery Co., Philadelphia, Pa., manufacturer of the well-known Exide batteries, has made a careful survey of the field and, as a result, has reached the conclusion that while passenger automobile batteries are not adapted to this service there are no conditions which cannot be met by a properly designed storage battery. It has therefore brought out a complete line of tractor type batteries developed especially for this service. These batteries have been subjected to the most severe shock and vibration tests without failure and their design is such as to withstand extreme neglect with the minimum injury.

The plates are of very heavy and rugged design. Separators are of combination treated wood and perforated hard rubber. This type of separation combines the good points of wood and hard rubber, being employed where the conditions are very severe, as for example, mine locomotive service, and the results are well known. Plate groups are supported on soft rubber bridges, an additional protection against shocks or vibration.

The jars and covers are made of

Exide Tractor Type Storage Battery.

the well known "Giant" compound, so that breakage is practically eliminated.

Covers are of the double-flange type, permitting the strongest and best sealing, only used where special precautions against acid leakage are essential. With this construction the cover supports the top of the jar from the outside as well as the inside so that it cannot break away from the seal and thus a permanently tight joint is rendered possible.

Elements are proportioned to fit the jars tightly and extra heavy sealing nuts are used on the pillars to anchor them in place. Jars are set in compound in the carrying cases, and as an additional precaution, the latter are equipped with through bolts so that the sides can be drawn together, holding the jars firmly in place.

Intercell connectors are of flexible copper, to prevent crystallization and consequent breakage under severe vibration and are lead-plated to prevent corrosion. Terminal connectors are standard lug type.

While from the standpoint of initial cost the Exide tractor type batteries are necessarily somewhat more expensive than the automobile type, it should not be overlooked that from the standpoint of service they will prove considerably cheaper, due to the fact that the rugged construction employed will not only result in greater reliability and freedom from trouble, but also in a very much longer life.

High-Voltage Generators for Radio Communication.

For use in continuous-wave radio work the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has manufactured a number of types of small direct-current machines, which have been used by the Signal Corps for communication in France, and by the Navy. One of these is a double-commutator generator, giving direct current at 27 volts, 2.5 amp. to light the filaments of three-element vacuum tubes, and at 280 volts, 80 milliamp. for the output circuit of vacuum tubes used to generate continuous high-frequency oscillations. This generator is mounted on the landing gear of an airplane, so that the back wash of the propeller drives the generator by means of a small two-blade wooden fan. Thus the generator runs whenever the plane is in motion, and also when it is on the ground with the engine running. Constant voltage with variable speed is secured by an ingenious arrangement of differential fields controlled by a two-element vacuum tube mounted in the streamline housing at the rear of the machine.

This generator furnishes power for sending and receiving radiotelephone messages between airplanes, and between airplanes and the ground.

For use at ground stations, a Westinghouse dynamotor was developed to operate from batteries. It has an input of 10 volts, 9.3 amp. and output of 80 milliamp. at 350 volts or 166 milliamp. at 300 volts. Originally it was mounted on a light metal framework with a panel carrying a voltmeter, fuses and terminals, but recently a metal carrying case has been designed, which has a top plate mounting a switch, fuses, and terminals, to which leads are permanently attached. When not in use, these are folded inside the lid. A rubber gasket makes the box watertight when closed This dynamotor is used with continuous-wave sets for both telegraph and telephone communication.

A similar dynamotor was furnished to the Navy for use on submarine chasers, the voltages being 27.5 and 300. These machines were mounted in pairs, one serving as a spare, in a spring cradle. This was done to minimize noise, which might be heard by the sensitive listening devices of an enemy submarine in the immediate vicinity.

Trade Activities

Koch & Co. Organized—Electro Steam Radiator Engages Larger Quarters — Dayton-Dowd Opens Chicago Branch

Edison Storage Battery Co., Orange, N. J., has issued a new price list, effective March 1, reducing the price of types A, B and G Edison cells approximately 16%. This company is also boosting prosperity by using the slogan "Procrastination murders industry—stir things up!"

F. S. Williams and **D. L. Manning** have opened an electric and car service station in the D. L. Brown building, Pomeroy, Wash. The second floor has been remodeled and will be used for a display room; the first will be used as a repair shop. A large dynamo is being installed for the recharging of storage batteries.

Black & Decker Manufacturing Co., Baltimore, Md., announces the appointment of Charles W. Unbehaun as branch manager. Mr. Unbehaun was formerly connected with the Bailey-Drake Co., in the capacity of general eastern salesman. He will cover eastern New York and the State of Connecticut with the Black & Decker line of portable electric drills, lectroflater electric air compressors and electric valve grinders.

Jeffery-Dewitt Insulator Co., Huntington, W. Va., is distributing to power companies its new catalog No. 2 on the J-D high-tension disk insulator. This describes the details of these suspension, strain and post insulators, the latter being used for pole-top switches and in all places where a rigid type is necessary. Numerous illustrations are given of these insulators to show their details, typical installation views, and tests for flash over at high frequency; there are also many dimension diagrams of suitable attachment and connection hardware. Results of tests are tabulated. A view of the company's new plant at Kenova, W. Va., is also shown.

Irving Samuels has established offices in the Hunsicker building, Allentown, Pa., as an electrical and mechanical sales engineer and manufacturers' agent. Mr. Samuels is a graduate of Lehigh University and served as efficiency engineer for the Lehigh Valley Transit Co., Allentown, Pa., in 1913. He became engineer in charge of distribution for the Lehigh Valley Light & Power Co., also in Allentown, in 1914. In July, 1918, he resigned to accept a position as electrical engineer for the Air Nitrates Corporation in New York City in connection with the design and construction of the government nitrate plants at Toledo and Cincinnati, Ohio, and at Muscle Shoals, Ala. While with the Lehigh Valley Light & Power Co., Mr. Samuels served as chairman of the local section of the National Electric Light Association and also was chairman of the company's safety committee.

The Dayton-Dowd Co., Quincy, Ill., manufacturer of centrifugal and underwriters' fire pumps, announces the appointment of E. E. Maher as manager of its Chicago branch, with offices at 30 North Michigan boulevard. Mr. Maher, who is a well known sales engineer, was formerly western manager of the Lea-Courtenay Co., and more recently district manager for the Terry Steam Turbine Co.

Paul W. Koch & Co., Chicago, has been organized to take over the charter of the Electrical Sales Engineers, Inc., and combine that company with Koch & Sandidge. The new officers are as follows: Paul W. Koch, president; R. A. Alderman, vice-president; M. E. Gaffney, secretary, and M. S. Koch, treasurer. Mr. Alderman, the vice-president of the company, was for many years connected with Grassler & Geselschap of Milwaukee, and more recently has been interested in the Service Sales Co. of Green Bay, Wis., for which company he acted as secretary and treasurer. A. Engelman, who has been connected with the Electrical Sales Engineers, Inc., will continue with the new company as sales engineer.

Paul W. Koch.

The new company will act as Chicago district representatives of the Condit Electrical Manufacturing Co. of South Boston, Mass.; the Esterline Co., of Indianapolis, Ind.; and Lewis-Roth Corporation of Philadelphia, Pa., which lines were marketed formerly by the Electrical Sales Engineers, Inc., of which company Paul W. Koch was president. The company will act as sole distributors of the "Jiffy" adjustable cutter, which in the past has been marketed by Koch & Sandidge. In addition some new patented "Jiffy" tools will be marketed. The company will give considerable attention to building a foreign—as well as a domestic organization—and has already secured expert representation in many important foreign countries.

W. A. Jones Foundry & Machine Co., Chicago, manufacturer of gear speed reducers, power transmission machinery and special foundry and machine shop equipment, has opened an eastern office at 30 Church street, New York. Lemuel C. Biglow, who was formerly connected with the Morse Chain Co., Ithaca, N. Y., has been placed in charge of the new office.

The Horne Manufacturing Co., Brooklyn, N. Y., whose products consist of electric telegraph and lighting fixtures for ships, and equipment for ship communication, has opened a branch at 222 Grand Pacific dock, Seattle, Wash. The company specializes in the mechanical devices required in ship telegraph and telephone systems, and the installation of such equipments. Plans of the company have in view the establishment of a factory at Seattle, although no action in this matter is contemplated at this time. M. E. Weeks and A. A. Harris, experienced men from the Brooklyn house, are in charge of the company's Seattle branch.

Electro Steam Radiator Co., formerly located at 125 South Wells street, Chicago, has moved its general offices to 18-22 West Monroe street, and its factory to 147th and Page streets, Harvey, Ill. The new location will provide more desirable and commodious quarters and will enable the company to better handle the demand for Electro steam radiators and other of its products, for both domestic and foreign trade. The company is adding to its line a larger design of radiator, consisting of eight sections, 30 sq. ft. of superficial heating surface, with 1000-watt heating unit and a style M, or 12 sections, 40 in. high, having 60 sq. ft. of radiation with two 10000-watt heating units.

Reynolds Electric Co., with main office and factory at 422 South Talman avenue, Chicago, manufacturer of Reco flashers for electric signs, color hoods for sign lamps and reflectors for bulletin and poster boards, is sending out Bulletin 36 on Reco flashers for electric signs and displays, which supersedes all former lists. It describes in detail various types of flashers and flasher parts and contains numerous illustrations showing the many effects that may be obtained by the use of this equipment. The Reco flasher is made in every size, style or type, and to reproduce any electrical effect, and is approved by the National Board of Fire Underwriters and all local electrical inspection bureaus.

Current News

Weekly Record of Construction Activities—Conventions

EASTERN STATES.

Rutland, Vt.—In connection with the completion of electrification of the plants of a number of creameries in this district, the Western Vermont Power & Light Co. has been awarded a number of contracts for furnishing electric energy for operation. A new condensary has been installed in the plant of the Castleton Dairy Co., operated by motor drive; the Hood Creamery Co. is now using electric power for operation wherever possible, and a number of other works have also been electrified.

Rutland, Vt.—Rutland Railway, Light & Power Co. has been awarded a contract by the Rutland Railroad for furnishing additional electric energy for operation for a large new locomotive repair shop and coach repair building recently completed.

Clinton, Mass.—In connection with the proposed construction of a large new theater building by Philbin Brothers, to be located on Philbin block, estimated to cost in the neighborhood of $50,000, considerable electrical equipment will be required.

West Brookfield, Mass.—The Town Council is considering plans for extensions in the electric street-lighting system. Service is supplied by the Central Massachusetts Electric Co.

West Springfield, Mass.—The Town Council is understood to have arranged plans for the installation of a new heating plant in the school building in the Mittineaque district.

Providence, R. I.—The city has recently completed plans for the installation of a new central heating plant, to be used for municipal service. William Hartwell, City Hall, is architect.

New Britain, Conn. — Landers, Frary & Clark, manufacturers of electrical specialties, appliances, etc., have awarded a contract to the Torrington Building Co., Torrington, for the construction of a new four-story factory, about 60x162 ft., and one-story boiler plant, 40x42 ft., at Plainville, Conn.

Putnam, Conn.—Nightingale-Morse Mills, Inc., has had plans prepared for the construction of a new hydroelectric power plant at its works, to provide for increased operations.

Albany, N. Y.—The New York State Public Service Commission authorized the Rochester Railway & Light Co. to spend $225,400 for extensions and betterments of its road and electric department and $282,145 for betterments to its gas department. The improvement includes additional street lighting installation and new lighting facilities in recently incorporated territory, highway lighting, underground conduit extensions and other improvements in the company's Rochester station and in Canadaigua, N. Y.

Buffalo, N. Y.—In connection with various municipal improvements, the City Council is considering a bond issue for $136,000, to cover the cost of alterations and improvements at the municipal pumping stations, and the installation of new equipment.

Buffalo, N. Y.—It is reported that the United States Government is arranging for the establishment of a new radio station for Great Lakes communication at the foot of Michigan avenue. The plans cover the erection of two steel radio towers, each about 200 ft. high.

Chatham, N. Y. — Spencertown, about four miles from Chatham Village is planning to come within the lighting district supplied by the Chatham Electric Light Co. The lines of the company are to be extended to accommodate them, using for the most part current generated by the Albany Southern Railway Co.

Cobleskill, N. Y.—In connection with various improvements and alterations to be made in the Home Economics building at the Schoharie State School of Agriculture, it is understood that considerable new electric wiring, etc., will be required. D. D. Frisbie is president of the board of trustees.

Jamaica, L. I., N. Y.—H. & B. Development Co., 529 West 50th street, New York, has had plans prepared for the construction of a new one-story brick and steel factory building, about 60x120 ft., to be located near the Long Island Railroad freight station, Jamaica, L. I., estimated to cost $18,000. The structure will be occupied under lease by the Multiple Storage Battery Co., 427 50th street, New York. Contract has been awarded to the Austin Co., 217 Broadway, New York.

Jamesville, N. Y.—Considerable new electrical equipment will be required by the board of managers of the Onondaga County Penitentiary in connection with the installation of a new refrigerating plant at the local institution, contract for which was recently awarded.

New York, N. Y.—Vico Supply Co., Inc., 115 Broadway, advertised as the "largest exporter of electric lamps in the United States," is advertising for sale a total of 500,000 of the highest grade guaranteed tungsten electric lamps of low and high voltage, with Edison screw or bayonet base at attractive prices. The company states that it is in position to deliver up to 1,000,000 lamps monthly.

Niagara Falls, N. Y.—U. S. Light & Heat Corporation, Highland avenue, is having plans prepared for the construction of a one and two-story addition to its plant at 3215 Highland avenue, to provide for increased operations. Mills, Rhines, Bellman & Nordhoff, Toledo, Ohio, are architects and engineers for the company.

Rome, N. Y.—Rome State Custodial Asylum has under consideration plans for improvements, including extensions to the electric power plant, to cost about $20,000. New stokers and other equipment at the boiler plant will be installed to cost $10,000, and new machine and repair shops, $20,000. Charles Bernstein, superintendent.

Westfield, N. Y.—Armour & Co., Chicago, are understood to have awarded a contract for the construction of a new local factory and power plant, two and three-story, about 116x200 ft., estimated to cost in excess of $250,000.

Bayonne, N. J.—Notice has recently been filed by the General Lighting Co., 464 Boulevard, of authorization to operate in a general electrical contracting capacity. John Kwatosky, 9 East 50th street, heads the company.

Dover, N. J.—Newton Gas & Electric Co., Newton, is negotiating with the New Jersey Power & Light Co., Dover, for supplying electric energy for distribution at Newton and neighboring sections. Upon the completion of negotiations, it is understood that the New Jersey company will commence the construction of a new 33,000-volt, three-phase transmission line and substation, to be owned by the first mentioned concern, for this purpose.

Jersey City, N. J.—In connection with the proposed construction of the New Rialto Theatre at Newark and Summit avenues, by the Orpheum Theatre Corporation, estimated to cost in the neighborhood of $750,000, considerable electrical equipment will be required.

Newark, N. J.—Electrical Engineering & Maintenance Co., 227 West Kinney street, has filed notice of organization to engage in general electrical construction and contracting. Louis Briller, 98 Morton street, heads the company.

Newark, N. J.—Lowenstein Radio Co., Inc., has arranged for alterations and improvements in its plant at 50 Spring street, to facilitate operations. A permit for the work has been issued.

Newark, N. J.—Splitdorf Electrical Co., 98 Warren street, has taken out a permit for alterations and improvements in a section of its plant, to facilitate operations.

New Brunswick, N. J.—The Board of Freeholders has awarded a con-

tract for the installation of a new engine and compressor equipment at the county workhouse.

Trenton, N. J.—The Board of Public Utility Commissioners has granted permission to the Trenton & Mercer County Traction Corporation to issue five-year 6% gold notes for $200,000, to provide for improvements, extensions, etc. The proposed improvements will include the installation of a new unit in the power plant, $20,000; the sum of $10,000 for the electrolysis mitigation system; $1000 for the installation of a pit lighting system; the installation of a quantity of new power house equipment, $10,000; and other work.

Trenton, N. J.—A bill has been introduced into the State Legislature by Assemblyman Underwood Cochran (House Bill No. 51), which provides for the elimination of the service charges arranged for meters. It is understood that a number of large utility companies have shown opposition to the bill.

Verona, N. J.—Considerable new electrical equipment will be required in connection with the proposed construction of a group of one-story brick and concrete hospital buildings at Verona, by the Board of Freeholders of Essex county, Newark, plans for which are now nearing completion. The project is estimated to cost $200,000. Jordan Green, Essex building, Newark, is architect.

Ashmore, Pa.—Lehigh Valley Railroad has awarded a contract to the Robert & Schaefer Co., engineer and contractor, Chicago, for the construction of a 750-ton capacity, four-track, automatic electric, reinforced concrete locomotive coaling plant with a 750-ton storage reinforced sand handling plant for immediate installation at Ashmore. The contract price is given as $75,000.

Dorseyville, Pa.—Considerable new electrical equipment will be required in connection with the proposed construction of a new plant by the Demas Armor Cased Tire Saving Co., for the manufacture of tires, estimated to cost $100,000.

Erie, Pa.—Lake Erie Welding & Spring Co. plans a building 30x100 ft., and is in the market for a small amount of equipment, including a five-ton hoist.

Harrisburg, Pa.—Langhorne Electric Light & Power Co., operating in Bucks county, has been granted permission by the Public Service Commission to place into effect new service and minimum charges.

Philadelphia, Pa. — Philadelphia Rapid Transit Co. has completed arrangements for the construction of a new one-story reinforced-concrete and steel power house addition to its plant at 963 Beach street,to provide for increased operations. The structure will be about 22x30 ft.

Philadelphia, Pa.—Western Electric Co., Inc., has taken out a building permit for alterations and improvements in its building at 1100 York street. Contract for the work has been awarded to the Matthews Co., New York.

Washington, D. C.—Frank L. Wagner, 1413 H street, N. W., will build a new power plant at Georgetown, D. C., estimated to cost $25,000.

DATES AHEAD.

Pacific Coast Section, N. E. L. A., Pacific Division, National Electrical Jobbers' Association and California Association of Electrical Contractors and Dealers. Joint convention, Coronado, Cal., April 30 to May 2.

National Fire Protection Association. Annual meeting, Ottawa, Ont., May 6-8. Secretary-treasurer, Franklin H. Wentworth, 87 Milk street, Boston, Mass.

Southwestern Electrical and Gas Association. Annual convention, Galveston, Tex., May 12, 13 and 14. Headquarters, Hotel Galvez. Secretary, H. S. Cooper, 403-404 Slaughter building, Dallas, Tex.

National Electric Light Association. Annual convention, Atlantic City, N. J., May 19-23. Secretary, T. C. Martin, 33 West 39th street, New York City.

Illinois Association of Electrical Contractors and Dealers. Summer convention, Decatur, Ill., June. Secretary, N. M. Blumenthal, 179 West Washington street, Chicago.

American Society of Mechanical Engineers. Spring meeting, Hotel Statler, Detroit, Mich., June 17-20. Secretary, Calvin W. Rice, 29 West 39th street, New York City.

American Institute of Electrical Engineers. Annual convention, June 24-27. Adirondacks. N. Y. Headquarters, Lake Placid Club. Secretary, F. L. Hutchinson, 33 West 39th street, New York.

National Association of Electrical Contractors and Dealers. Annual convention, Milwaukee, Wis., July 15, 16 and 17. General manager, William H. Morton, 110 West 40th street, New York City.

Ohio Electric Light Association. Annual meeting, Cedar Point, Ohio, July 15-18. Headquarters, Breakers Hotel. Secretary, D. L. Gaskill, Greenville, Ohio.

Association of Iron and Steel Electrical Engineers. Annual convention, St. Louis, Mo., September, 1919. Secretary, John F. Kelly, Empire building, Pittsburgh, Pa.

Harrisonburg, Va.—The city has awarded a contract to Betts & Boice, Harrisonburg, for the construction of a new concrete dam at its hydroelectric power plant, estimated to cost $40,000.

Rural Retreat, Va.—Rural Retreat Power Co., recently incorporated with a capital of $25,000, is planning for the purchase of electric power from the Appalachian Power Co. for distribution in the Rural Retreat district and neighboring sections. J. S. Etter is president, C. W. Davis secretary.

Martinsburg, W. Va.—Baltimore & Ohio Railroad Co. is understood to be planning for the construction of a new subway on North Queen street, estimated to cost $100,000. It is said that of this sum $25,000 will be contributed by the city and the balance, $75,000 defrayed by the railroad company. H. A. Lane is chief engineer for the company.

Millville, W. Va.—Northern Virginia Power Co. has recently awarded a contract to the Consolidated Engineering Co., Calvert building, Baltimore, Md., for the construction of a one-story addition to its power plant at Millville.

Chatsworth, Ga.—A company is being organized with a capital of $50,000 to establish hosiery mill and electric light and power plants. Roy McGinty, J. G. Neely, T. W. Brooks and others, incorporators.

Moultrie, Ga.—Swift & Co. are understood to be arranging plans for the construction of a new power plant and a two-story addition to its local cold-storage building. The entire work is estimated to cost $150,000.

Bushnell, Fla.—The city sold $10,000 of bonds and will establish an electric lighting plant. Address mayor.

Miami, Fla.—South Atlantic Telephone & Telegraph Co. will expend $50,000 improving and extending the telephone system at Miami Beach. The specifications include installing new switchboard and underground conduits will be laid. Address Julius Smith, president.

Miami Beach, Fla.—Miami Beach Electric Co. has been granted franchise to establish an electric railway. The company will build lines on various streets, specified in the ordnance granting franchise. Address Carl G. Fisher, president.

Sebring, Fla.—Sebring Light & Water Co. has purchased and will improve its electric light plant.

NORTH CENTRAL STATES.

Berlin Heights, Ohio.—Fire recently destroyed the Lake Shore Electric station and subpower house, with total loss estimated at $15,000. Plans are under consideration for immediate reconstruction.

Cleveland, Ohio.—Three large dams will be built in Ashtabula county this spring to supply the city of Ashtabula with water and electric power. George R. McKay, 2052 East 90th street, and Ray B. Oliver, 1570 Compton road, Cleveland Heights, were granted a charter for the Northern Ohio Hydro Electric Co., which was capitalized at $306,000. Land already has been obtained in the Grant, Ashtabula and Conneaut river valleys. It is expected the company will supply the needs of the city street car lines and manufactories of Ashtabula. The entire cost will reach $3,000,000.

Cleveland, Ohio.—The city is considering improvements to its water works, water supply lines, power plants, etc., amounting to $500,000. Funds are to be raised through the sale of bonds. C. J. Neal, director of finance.

Lima, Ohio.—Plans have been prepared for a $125,000 hotel to be erected here by Tom Taggart of French Lick Springs, Ind. The specifications include a private electric plant, laundry and laundry equipment.

Indianapolis, Ind.—Pioneer Brass Works will build two new buildings, one a brass foundry and the other a machine shop, which will increase the capacity of the plant tenfold.

Logansport, Ind.—The city officials are planning to establish boulevard lights from College Hill to Spencer Park. This change could be made and proposed lights installed along the routes at present proposed without burdening the electric light plant. A large number of the property own-

ers who have been approached in regard to the matter are said to be in favor of the plan and an effort is to be made to have definite action taken and the work of installing at an early date. Address superintendent of City Light and Power Plant.

Muncie, Ind.—It is announced that the General Motors Corporation will expend $800,000 in extension to its Muncie plant.

South Bend, Ind.—The Indiana Public Service Commission has authorized an increase in the rate for passenger service on the Chicago, Lake Shore & South Bend Railway Co. from 2½ cents a mile to 2¾ cents a mile. This is a temporary order and will be effective from April 1 until December 1, 1919. The Commission refused the petition of the company for an increase to three cents a mile.

South Bend, Ind.—Indiana & Michigan Electric Co. has installed a revolving screen sieve at the foot of the Colfax bridge for the purpose of separating leaves and other residue from the water before it is received by the turbines in the power plant.

Washington, Ind.—The city has petitioned the Public Service Commission for authority to issue $20,000 in bonds for improving the lighting plant. Address city clerk.

Carlock, Ill.—Carlock Light & Power Co. has incorporated with a capital of $15,000 for the purpose to furnish light, heat and power. H. B. Carlock, director.

Deer Creek, Ill.—A company with a capital of $15,000 is being organized here for the purpose of building an electric light line from Deer Creek to Cruger. J. A. Danforth, Samuel Belsley and Jacob King have been appointed a committee to secure the necessary papers.

East Moline, Ill.—Orman Hotel Co. will erect $150,000 brick and stone hotel building, five stories, 42x120 ft., containing 100 rooms.

East St. Louis, Ill.—East Side Packing Co. has awarded a contract to the Keeley Brothers Contracting Co. for the erection of a new factory and cold storage building, 191x192 ft., seven stories high, all steel and reinforced concrete and faced with brick and terra cotta. Total estimated cost, $300,000.

Moline, Ill.—The generator at the Moline power plant of the Tri-City Railway & Light Co., which has been out of commission for a number of months, has been repaired at a cost of $25,000 and is now in working order. A new generator which was ready for use at the time the old one broke down, produced all the power during the time repairs were going on. With the old one back in commission, the company states it will be able to handle all emergencies.

Moline, Ill.—Moline Electric Co. has secured the contract for the erection of a consolidated grade and high school and also a teachers' home at Huron, Iowa.

New Berlin, Ill.—Central Illinois Public Service has filed an application with the Illinois Public Utilities Commission for a permit to build a high-tension transmission line from connection points to New Berlin and to supply that town with electric light and power.

Springfield, Ill.—Deer Creek Power & Light Co. has been given a permit to organize with capital of $15,000. Joseph A. Danforth, Samuel L. Belsley and Robert H. Guengerich are the incorporators.

Marquette, Mich.—The commission ordered that bids for the construction of a new $140,000 power and light plant be submitted. It is planned by the commissioners to send blank forms for bids to a number of contractors. Superintendent Retallio submitted an estimate of the cost of the plant.

Muskegon Heights, Mich.—United Home Telephone Co. has found it necessary to establish a substation in this city. Thomas Bromley, Jr., general manager of the company, states that a building and switchboard system to cost $30,000 is being planned and that work will begin within two weeks.

Sodus, Mich.—Wallace King is a member of the committee appointed to secure electric lighting and power. Superintendent Cavanagh of the Benton Harbor & St. Joseph Railway & Light Co., was present and made a proposition to bring electric lights to the village, providing the people interested would sell bonds for the company, aggregating $1000 per mile.

Superior, Wis.—Superior has passed by an overwhelming majority a proposition to purchase the local electric light, gas and water plants.

Minneapolis, Minn.—Sales department of the Minneapolis General Electric Co. during the week ended March 28 secured 307 new electric light and power customers with 260 kw. of lighting and 458 hp. in motors. New business connected to the company's lines shows an increase of 133 customers with 116 kw. of lighting and 670 hp. in motors. Business reconnected includes 350 hp. for the artificial ice plant which has been closed for the past year on account of government restrictions and 669 hp. for the Trap Rock Co., which was temporarily disconnected during the cold weather. The output of electric energy shows a gain of 22.3% over the corresponding period last year. Bank clearings for March show a substantial increase over a year ago, the amount this year being $162,267,087, compared with $141,324,320 a year ago.

Boone, Iowa.—Boone County Telephone Co. contemplates expending $25,000 for improving its lines. Address Guy H. Pratt, mayor.

Dubuque, Iowa.—A petition containing more than 2000 names has been filed with the Council, asking the city to take steps to provide a municipal lighting plant.

Dubuque, Iowa.—Dubuque's new contract with the Dubuque Electric Co. for the furnishing of electric current for street lighting for the next five years went into effect April 1. The contract was signed by Mayor Saul and electric company officials a few days ago. Although the old contract with the electric company expired some weeks ago, the company granted an extension until April 1 until the company and the Council could reach a definite decision regarding the length and terms of the contract.

Marshalltown, Iowa.—A bill is before the legislature to give authority for extending the Iowa Railway & Light Co.'s lines to the grounds of the Old Soldiers' Home. Twenty-three thousand dollars will be required to buy the right of way.

Ottumwa, Iowa.—The citizens have voted in favor of municipal lighting. Address Charles O. Warren, mayor.

Story City, Iowa.—This town has under consideration a $50,000 electric light plant.

Clarksville, Mo.—Clarksville Electric Light & Water Co. has been organized. The company has obtained a franchise from the City Council and the proposition will be voted on at the April election. Work will begin on a new plant immediately after the results of the election are known.

Joplin, Mo.—The contract has been let for a five-story Y. M. C. A. building to the Eberhardt Construction Co., Salina, Kans. The bid of this company was $215,294, as against $205,286, which was the conservative estimate of the architects, Smith, Rea & Lovitt, of Kansas City, Mo., a year ago. The increase of only $10,000 was noted by contractors generally. It had been predicted that in view of present market conditions no bid would be offered less than $240,000.

Kansas City, Mo.—T. H. Lishear has secured the contract for the erection of the House of Good Shepherd, the initial expenditure to be in excess of $150,000. The original group of buildings will consist of three connected buildings, a three-story convent building, 43x108 ft., for the sisters; a four-story children's building, 51x149 ft., and a one-story chapel. A power house, garage and other buildings will be located apart from the main group.

Kansas City, Mo.—Judge John H. Lucas has been in Jefferson City consulting with the Missouri Public Utilities Commission relative to a proposed bond issue by the Kansas City Light & Power Co. He says that while plans are not formulated as yet, the company would probably ask the Commission for authority to issue $6,000,000 for a new power plant embodying four units. It will be the intention of the company to eventually consolidate the units.

Kansas City, Mo.—It is said that the Kansas City Light & Power Co. may ask for a bond issue of $6,000,000, the preliminary steps before the Missouri Public Utilities Commission having been taken. It is the purpose of the company to erect a new power plant of four units and later to consolidate the four units.

Poplar Bluff, Mo.—Plans are being made for the erection of a big power plant to connect with several towns in the vicinity, by high tension wires.

St. Joseph, Mo.—Charles L. Faust, city counselor, is working on ordi-

nances which will be submitted to the Council providing for a bond issue of $500,000 for an electric light plant, $500,000 for a new city hall, $760,000 for sewers and $50,000 for further motorization of the fire department. This will make a complete bond issue of $1,810,000.

St. Joseph, Mo.—Swift & Co. will erect an addition to the north boiler room, brick, two stories high, with modern mechanical equipment which will cost complete $90,000. It will give the plant an additional 1000 hp. Included in the equipment will be two 500-hp. boilers with chain grate stokers and two boiler feed pumps. A new smokestack of reinforced concrete will be erected. The total improvements will cost $25,000.

St. Joseph, Mo.—J. H. Van Brunt, general manager of the street railway company, returned from New York City where he was in conference with the engineers of Henry L. Doherty & Co., the parent company, regarding the improvements to the local power plant. Actual construction work will start within ten days.

St. Louis, Mo.—Union Electric Light & Power Co. has sold the building which it tenants under a 20-year lease to Paul Brown, who has taken it over as an investment. The price as indicated by the revenue stamps on the deed was about $1,000,000, although the nominal consideration was $1000. The building is 11 stories high, 149x100 ft., and is one of the most substantial in the St. Louis downtown district.

Sikeston, Mo.—A special election will be held in June to vote on a $75,000 bond issue for the erection of a municipal light plant.

Sharon Springs, Kans.—Black & Veatch, engineers, 507 Inter-State building, Kansas City, Mo., have prepared plans for $40,000 worth of improvements to be made to the electric light and water works. Address Harry C. Wheeler, city clerk.

Beatrice, Neb.—Fire in the boiler room of the Dempster electric light plant caused property loss of about $1000.

Omaha, Neb.—Board of Education has made tentative plans for erection of three-story and utility attic High School of Commerce, 240x120 feet, $800,000.

Herrick, S. D.—Henningson Engineering Co., National Bank building, Omaha, Neb., has completed preliminary plans for improving the municipal electric light plant and water works system. An election will be held to submit bond issue to voters.

Madison, S. D.—The city plans an election to vote on $125,000 bonds to build an electric light plant.

SOUTH CENTRAL STATES.

Ghent, Ky.—Ghent Electric Light Co., recently organized with a capital of $5000, is planning for the construction of a local electric light system. The company has been granted a municipal franchise.

Louisville, Ky.—Commercial department of the Louisville Gas & Electric Co. during the week ended March 28 secured 75 new electric light and power customers with 35 kw. of lighting and 156 hp. in motors, and closed contracts for wiring 24 already built houses. New business connected to the company's lines includes 88 customers with 40 kw. of lighting. Electric energy output was 10.6% greater than during the corresponding week of 1918.

Lookout Mountain, Tenn.—Fire recently destroyed the local power plant, with total loss, including machinery and equipment, estimated at $50,000. It is understood that plans are being considered for rebuilding.

Gloster, Miss.—The city has arranged plans for the installation of a quantity of new equipment in the municipal electric light and water plant, estimated to cost about $11,000.

Lexington, Miss.—The city contemplates establishing an electric light plant. The specifications include steam or oil engines. Address W. L. Jordan, city clerk.

Senatobia, Miss.—The city plans to build electric and water works plants. Fifteen thousand dollars in bonds will be issued. Address mayor.

Mobile, Ala.—An electric power plant will be established by the Mobile Electric Co., to cost about $1,000,000. Address T. K. Jackson, manager.

Batesville, Ark.—H. V. Hoyt has under consideration the placing of machinery in grain elevator to furnish light and power to the village.

Little Rock, Ark.—Arkansas Hydro-electric Development Co. has increased its capital $450,000 to provide for extension work and installation of equipment.

Clarendon, Ark.—Commonwealth Power Co. proposes to erect an electric power plant.

DeRidder, La.—The city is arranging plans for the installation of new pumping plant, and the construction of a new electric light and power plant, to be used for municipal service. It is understood that a bond issue for $90,000 to cover the cost of the work is planned.

Commerce, Okla.—Arrangements have been made for the placing of street lights on Commerce street, the entire length of the business section. Work on the installation will begin at once. Lights will probably also be installed on other business streets, but definite plans have not been made.

El Reno, Okla.—New industries organized at El Reno include the W. E. Bible Storage Battery Mfg. Co. and the Nugget Refining & Manufacturing Co.

Enid, Okla.—The Enid division of the Oklahoma Gas & Electric Co. reports prospects of largely increased power load before the end of April, including resumption of operations by the local brick yard and Arctic Ice Co.

Hanna, Okla.—The Commercial Club, recently organized, is making arrangements for a new light plant.

Sapulpa, Okla.—The Sapulpa Electric Co. during the past week established a new peak record of 1160, with a daily output of 14,763 kw-hr. Electric energy requirements of the local ice company have been increased from 33 to 53 hp.

Dallas, Tex.—The city commission has just approved expenditures of approximately $500,000, made by the Dallas Power & Light Co. The transactions involved in these expenditures are the purchase of the Dallas Ice, Fuel, Light & Power Co. and the Carroll Electric Co., both of which plants are to be taken over and merged into the system of the Dallas Power & Light Co.

Fort Worth, Tex.—Plans are under consideration by the City Commission for a bond issue for $50,000 to provide for extensions in the municipal electric light system.

Fort Worth, Tex.—Richard Ferris and H. E. Robison of Fort Worth, promoters of the proposed interurban electric railway to run between this city and Mineral Wells, will soon begin making the survey for the line. The right of way of the first 45 miles out of Fort Worth will be secured as soon as the survey is finished, it is stated.

Fort Worth, Tex.—E. P. Turner of Dallas and associates have been granted a franchise by the commissioners' court of Tarrant county to construct an interurban electric railway over the highways outside the limits of Fort Worth. It is stated the proposed line will run from this city to Abilene, via Mineral Wells, a distance of about 200 miles. Mr. Turner and associates have for some time past been promoting the construction of two interurban electric railways to run out of Dallas. They organized the Dallas & Southwestern Traction Co. to build a line from Dallas to Glen Rose, and the Dallas & Northwestern Traction Co. to build a line from Dallas to Wichita Falls. Considerable preliminary work towards the construction of the two railways has been done.

Fort Worth, Tex.—On April 8 an election will be held to decide the question of issuing $50,000 in bonds for extending electric lighting. Address mayor.

Houston, Tex.—The work contemplated for improving the water system includes electric pumps. Address mayor.

Wichita Falls, Tex.—Munger Ranch Oil, 612 Seventh street, recently incorporated with a capital of $60,000, is planning for the construction of a new power plant and the installation of a pumping station.

WESTERN STATES.

Crook, Colo.—An election will be held soon to vote on the proposal to issue $20,000 in bonds for the installation of an electric light plant and water works system. Plans are being prepared by the Henningson-Engineering Co., Omaha, Neb.

Gallup, N. Mex.—Gallup Electric Light & Power Co. has been incorporated here for the purpose of purchasing the electric light and power plant that is owned by Gregory Page and associates. The plant will be enlarged and otherwise improved.

Salt Lake City, Utah.—The city contemplates improvements to its water works, water supply lines, power plants, etc., to cost approximately $1,000,000. Bonds will be raised through the sale of bonds.

Marshfield, Ore.—Sitka Spruce Co. is operating its plant at Coquille, Ore., on double shift. Electric energy amounting to 250 hp. in motors is supplied by the Mountain States Power Company. The Buehner Lumber Co., of North Bend, whose requirements of electric energy amounting to 700 hp. are supplied by the Mountain States Co., expects to begin operation on double shift in the near future. The Kruse & Banks Shipbuilding Co. has received contracts for two large sailing vessels, these being the first private contracts awarded in this district since the shipbuilding yards began work on government contracts.

Spokane, Wash.—The Washington Public Service Commission has authorized the Spokane & Inland Empire Railroad Co. and the Washington Water Power Co. to charge a six-cent fare. This order followed the request of the two companies for an increase from five cents to seven cents.

Brawley, Cal.—The Southern Sierras Power Co. is understood to be arranging plans for the construction of a new substation at Brawley.

Fresno, Cal.—The San Joaquin Light & Power Corp. is arranging plans for a consolidation with the Midland Counties Public Service Corp. A. C. Balch is president of the latter concern.

San Diego, Cal.—The United States Navy Department has recently completed plans for the installation of a new floodlighting system at the naval coaling station at La Playa.

San Francisco, Cal.—The city contemplates spending $17,000,000 for water and power plants. Money for this work is to be raised through the sale of bonds.

Tulare, Cal.—The Mt. Whitney Power & Electric Company has recently commenced work on improvements and extensions in its plant and system, the entire work being estimated to cost approximately $82,000. The work will comprise extensions in its power lines, to cost $60,000, improvements in its Tulare lines, to cost $17,000, and the installation of new equipment, etc., to make up the total of $82,000.

Willows, Cal.—The Northern California Power Co. is considering plans for the construction of a new local substation, to provide for increased capacity. It is understood that a number of new pumping plants will be erected in this vicinity, and in connection with other increased business, necessitates the extension.

Woodland, Cal.—The Pacific Gas & Electric Co. is understood to be considering plans for increased operations in this vicinity. It is understood that several new pumping plants will be erected by the Alameda Sugar Company, power to be furnished by the Pacific company.

INCORPORATIONS

New York, N. Y.—Federal Electrical Products Corporation. Capital, $5,000. To manufacture electrical specialties. Incorporators: A. and B. and L. Blum, 52 Broadway.

Brooklyn, N. Y.—William J. Pieters X-Ray Laboratory, Inc. Capital, $5,000. To deal in X-Ray apparatus. Incorporators: E. Liska, W. J. and A. Pieters, 101 Audubon avenue.

Tuckahoe, N. Y.—Elgo Manufacturing Co. Capital, $10,000. To manufacture electric bells and kindred specialties. Incorporators: G. W. Smyth, J. J. Monahan and J. A. McLoughlin, 154 91st st.

Syracuse, N. Y.—Chapin & Baker Manufacturing Co. Capital, $25,000. To manufacture engines, boilers, etc. Incorporators: C. H. Searl, F. E. Baker and E. I. Chapin.

Pompton Lakes, N. J.—Tri-County Electric Co. Capital, $25,000. To operate a local electric light, heat and power plant. Incorporators: Samuel W. McElroy, E. V. McElroy and Henry G. Hershfield.

Worcester, Mass.—Worcester Battery Exchange, Inc. Capital, $10,000. To operate in a general electrical engineering capacity, and deal in electrical supplies. Incorporators: Philip R. Ammidon, A. Ingham Bicknell, Cambridge; and H. M. Clifford, Revere.

Pittsburgh, Pa.—Central Electric Tool Co. Capital, $5,000. To manufacture electric tools of various kinds. John A. Metz, Dormont, is the principal incorporator.

Philadelphia, Pa.—Pennsylvania Electric Welding Co. Capital, $10,000. Incorporated under Delaware laws, to engage in general electric welding operations. Incorporators: Clayton P. Plunkett, George H. Beck, and Albert Schroeder, Philadelphia.

Memphis, Tenn.—Dixie Engine Co. Capital, $50,000. To manufacture engines, etc. Incorporators: E. H. Kimmons, Jr., Lemuel Dougherty, D. L. Devere, A. M. Bradford, and E. C. King.

Chicago, Ill.—Hall Radio Corporation. Capital, $400,000. Incorporated under Delaware laws to install commercial wireless systems. Incorporators: Samuel C. Wood, A. D. Suess, Chicago; and L. B. Phillips, Dover.

Smithland, Ky.—Smithland Light & Power Co. Capital, $8,000. To operate a local light and power plant. Incorporators: G. L. Crawford, H. Wilson, and M. L. Poell.

Houston, Tex.—Houston Guadalupe Water Power Co. Capital, $200,000. To operate a local hydroelectric power plant. Incorporators: H. A. Halverton, F. T. Beadle, and C. L. Kolb.

Philadelphia, Pa.—Pennsylvania Electric Welding Co. Capital, $10,000. To engage in general electrical contracting operations, etc. John S. Thompson is the principal incorporator.

Norfolk, Va.—General Electrical Machinery Corporation. Capital, $20,000. To engage in the manufacture of electrical equipment, machinery, etc. Incorporators: William A. Burkard, and E. T. Henderson.

Petersburg, Va.—Cockade City Electric Co. Capital, $20,000. To manufacture electrical supplies, etc. Incorporators: B. Mason, president; D. M. Barner, secretary and treasurer.

Rock Hill, S. C.—Stegall Water & Light Co. Capital, $25,004. To engage in the installation of water and light systems, etc. J. Webb is secretary and treasurer.

Austin, Tex.—Cummings Electric Supply Co. Capital, $20,000. To engage in the manufacture of electrical supplies, etc. Incorporators: G. C. Sanford, R. L. Gresham, and J. G. Cummings.

Dubuque, Iowa.—United Electric Co. To deal in electrical supplies and conduct a general business. Joseph Lowe, president and treasurer, and Clarence L. Willging, secretary. Capital stock, $15,000.

Brooklyn, N. Y.—Victory Electrical Supply Co. Nominal capital, $5,000. To manufacture electrical supplies, etc. Incorporators: A. W. Brooke, J. H. Avaztan, and J. Wolff, 1089 Eastern Parkway, Brooklyn.

PROPOSALS

Lighting Equipment.—Bids will be received until April 19 by the Water and Light Commission of Waterloo, Wis., for the installation of a new unit. Plans and specifications will be furnished upon application. Z. O. Failinger is secretary.

Electric Light Plant.—Bids will be received at Benson, N. C., for water works and electric light plant. The work will consist of deep well and pump, combined water and electric station, 60 and 100-kw. units, boilers, pumps and reservoir and about five miles of water pipe lines. Address Ezra Parker, mayor.

Hoistway and Electric Dumbwaiter.—Bids will be received by the supervising architect, Washington, D. C., on April 17, for installing complete a hoistway and electric dumbwaiter in the United States postoffice and courthouse of Pittsburgh, Pa., in accordance with the drawing and specification, copies of which may be had at the above office at the discretion of the supervising architect. Address James A. Wetmore, acting supervising architect, Washington, D. C.

Wood Working Machine.—Bids will be received April 29 by the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., for one portable wood-working machine with motor drive, complete for service at Norfolk, Va. Schedule 3881.

Personal

Raymond H. Smith New President of Wisconsin Electrical Association — Colonel Junkersfeld Joins Stone & Webster

LORNE C. WEBSTER has been appointed president of the Quebec Railway, Light, Heat & Power Co., succeeding the late Sir R. Forget. Senator D. O. Lesperance, of Quebec, is the new vice-president.

RALPH ELSMAN, general manager of the Kings County Lighting Co., Brooklyn, N. Y., has been elected vice-president of the company. He will continue in the office of general manager in addition to his new duties.

WALTER P. HATCH, for nine years in charge of the wire sales division in the home office of the Morgan Spring Co., Worcester, Mass., is now district sales manager for the western district and will make his headquarters at Chicago, Ill.

R. L. BAKER, formerly manager of the electrical and battery department of the Railway & Mine Supply Co., Chicago, has opened an office in the Edison building, Chicago, where he will engage in the salvage of power plants and usable steel and wood scrap.

CAPT. L. W. NIMS, of Engineer's Corps, U. S. Army, received his discharge from service. Captain Nims, a brother of F. D. Nims, general manager of Washington Coast Utilities, Seattle, formerly was on the engineering staff of the Utah Power & Light Co., Salt Lake City.

H. H. SKINNER, formerly connected with the power engineer bureau of the sales department of the Narragansett Electric Lighting Co., Providence, R. I., is now representing the Westinghouse Electric & Manufacturing Co. in the Rhode Island and eastern Connecticut territory and has established headquarters in the Union Trust building, Providence, R. I.

BARZILLAI G. WORTH, formerly electrical engineer, and vice-president of Walter Kidde & Co., Inc., was recently elected treasurer of the Monmouth Chemical Co. and will have charge of the manufacturing and research. This company produces potassium chlorate electrolytically, using processes and apparatus developed by Mr. Worth.

R. E. S. GEARE, well known in the construction and power plant field in Chicago and the Middle West, was recently elected president of the Mid-West Manufacturing Co., Old Colony building, Chicago. Mr. Geare will continue his work of active representation of the T. L. Smith Co., Manistee Iron Works Co., Geare & Co. and other concerns. The Mid-West Manufacturing Co. has acquired the sales and manufacturing rights of the "Continental" chain-grate stoker from the Manistee Iron Works and of the "Chaingrip" pipe vise and tools from the Gerolo Manufacturing Co.

G. A. SHOEMAKER has been placed in charge of the western sales zones of the Graton & Knight Manufacturing Co., Worcester, Mass., which includes Chicago, Milwaukee, Minnesota, Kansas City, Dallas, St. Louis and New Orleans.

RAYMOND H. SMITH, recently recently elected president of the Wisconsin Electrical Association and of the Wisconsin Gas Association, is vice-president and general manager of the Eastern Wisconsin Electric Co. with

Raymond H. Smith.

offices at Sheboygan, Wis. Mr. Smith entered the utility field with the Waterbury Traction Co., Waterbury, Conn., in 1897, and held various positions in the electric and railway departments until 1900, at which time he became assistant superintendent of the railway. In 1900 he was transferred to the headquarters of the Connecticut Railway & Lighting Co. at Bridgeport, Conn. In 1903 he was made superintendent of the company at Bridgeport and held this position until 1907 at which time he became general manager of the Albany & Hudson Railroad Co., of Albany, N. Y. This company, two years later, passed through a receivership, and Mr. Smith was made receiver, and later was made general manager of the reorganized company, the Albany Southern Railway Co.

In 1912 Mr. Smith left Albany and became general manager of the Jackson Light & Traction Co., of Jackson, Miss., which position he held until 1916. In November, 1916, he was made vice-president and general manager of the Sheboygan Electric Co., of Sheboygan, Wis. In March, 1918, the company was consolidated with the Wisconsin Electric Railway Co., of Oshkosh, Wis., and the Eastern Wisconsin Railway & Light Co., of Fond du Lac, and Mr. Smith was made vice-president and general manager of the consolidated companies, the Eastern Wisconsin Electric Co.

HARRY TORREY, of Madison, N. J., superintendent at the municipal light plant at Chatham, N. J., has resigned to become superintendent of the local municipal light plant.

FRANK DIX, formerly superintendent of the municipal light and power plant at Fort Wayne, Ind., has been appointed county engineer of Allin county and superintendent of the county light and power plant.

G. L. MAYER has severed his connection with the Joseph Joseph & Brother Co., Chicago, to become buyer for the James S. Miller Co., Chicago. Mr. Mayer was formerly purchasing agent of the Ohio Electric Railway Co., resigning that position to join the Joseph company.

J. MCDONALD SMITH, formerly chief engineer of the Triumph Electric & Ice Machine Co., has left the company to represent the Australian interests of the Texas Oil Co., with headquarters at Sydney, Australia. Mr. Smith leaves behind him in the electrical industry a host of friends and an enviable record.

E. C. CHERRINGTON and T. R. COOLEY, who for the past few years have been in the sales service department of the Cutler-Hammer Manufacturing Co. at Milwaukee, have been transferred to the Pittsburgh office of the central district, Mr. Cherrington becoming office manager and Mr. Cooley, engineering correspondent.

PROFESSOR MICHAEL PUPIN, of the electrical engineering department of Columbia University, sailed for France on the White Star liner on March 28. He has gone abroad to lend his assistance to the Peace Conference and expects to be gone until June unless the conference finishes its deliberations before that date. Professor Pupin was royal consul-general for Serbia in the United States until a few months ago, when another representative was sent over from Europe. He is regarded as an authority on the Slav races.

CLYDE A. FLINT, for many years connected with the electric heating industry, has received the appointment of sales manager of the Rathbone Sard Electric Co., Inc., Albany, N. Y. Mr. Flint entered the industry in 1905, starting with the Simplex Electric Heating Co., of Cambridge, Mass., holding a number of positions in its factory and acting as representative through New England. He became associated with the Rathbone Sard company about three years ago to take up electric range work, and since then has had charge of the manufacturing, advertising, sales work and engineering, being responsible for many of the changes in the present line of Acorn ranges produced by the company.

CHARLES J. MARSH, connected with the Standard Underground Cable Co., Perth Amboy, N. J., was recently elected president of the New York Metal Exchange at its annual election.

FRED H. WALDRON, formerly Minneapolis representative of the Chicago Pneumatic Tool Co., Chicago, was recently appointed manager of the pneumatic tools sales division of the company, succeeding J. G. Osgood, resigned.

MELBURN BRANT, who was commissioned captain in the United States Army, has rejoined the Byllesby forces as a salesman for the bond department in New York City. Before entering the service Mr. Brant was connected first with the publicity department and later with the bond department of H. M. Byllesby & Co., Chicago office.

D. W. BLAKESLEE, electrical engineer, formerly assistant superintendent of the Pennsylvania Electric & Manufacturing Co., has, after serving about two years as first lieutenant, 56th Engineers, A. E. F., returned to his civil occupation with the Jones & Loughlin Steel Co., Pittsburgh, Pa. While in France Mr. Blakeslee did experimental and development work in connection with anti-aircraft searchlights and sound-ranging applications. He now makes a specialty of mill and factory lighting and power applications.

ALBERT T. KUNZ, who for many years has served the Houston Electric Co., Houston, Tex., in various capacities, has been appointed to the position of purchasing agent of the company and also of the Galveston-Dallas Electric Railway Co. In addition, Mr. Kunz becomes general passenger agent of the latter road, being appointed to the position recently vacated by Rex D. Frazier, resigned. Mr. Kunz is a native of Houston and has been in the employ of the Houston Electric Co. since his boyhood days, literally growing up with the Houston office of the Stone & Webster interests.

LIEUT. COM. H. J. ELSON, U. S. Naval Reserve Force, has been released to inactive status and has resumed his civilian work as secretary and treasurer of the Walter A. Zelnicker Supply Co., St. Louis, Mo., with which company he was in charge of internal management and manufacturing operations. Mr. Elson was graduated from the U. S. Naval Academy in 1898 and after service in Cuba, the Philippines and China, resigned from the Navy in 1902 to become interested in the Zelnicker company. He was chief engineer of the Missouri Naval Militia with which organization he was mobilized into Federal service when war was declared. His assignment was inspector of machinery 9th, 10th and 11th Naval Districts, with headquarters at Chicago, where he had charge of the design and conversion to salt water use of machinery department of Great Lakes vessels taken over by the Navy Department, among which were the well known boats, *City of South Haven, Virginia* and *Puritan*, as well as rehabilitation and design and installation of new machinery in the ill-fated *Eastland*, now named *U. S. S. Wilmotte*. Mr. Elson will have the general management of operations and manufacturing of the Zelnicker company and its various subsidiaries.

IRVING SAMUELS, Allentown, Pa., formerly connected with the Lehigh Valley Light & Power Co., and chairman of the local section of the National Electric Light Association, recently established offices in the Hunsicker building, 17 North Seventh street, to engage in a general electrical and mechanical engineering capacity.

COL. PETER JUNKERSFELD, assistant to the vice-president of the Commonwealth Edison Co., Chicago, in charge of the contract, operating, electrical and construction departments of that company, resigned April 1 to become engineering manager for Stone & Webster, engineers, constructors and managers of Boston, Mass. Colonel Junkersfeld began his career with the Edison company in 1895, shortly after graduating from the University of Illinois, as a helper at the old Harrison street station. Shortly after this he entered the Engineering Department of

Col. Peter Junkersfeld.

the company and from then on he played a very prominent part in the development of the company. Among the most notable of his achievements while with the Edison company were his work in connection with the construction of its large generating stations and substations, his activities in supplying the Chicago surface and elevated roads with power and his investigation in 1906 of the electric power requirements of the steam railroads in Chicago.

In 1917, immediately following the declaration of war, he was one of the five reserve majors called into the service of what was later called the Construction Division of the Army. In this capacity he played a very important part in the organization of the department, in the building of many cantonments and in many other remarkable construction works which were accomplished during the period of the war. In recognition of his services he was promoted to lieutenant-colonel and later to colonel. He was discharged on March 4, 1919.

Colonel Junkersfeld was for two years president of the Association of Edison Illuminating Companies, was for three years vice-president of the American Institute of Electrical Engineers. He is also a member of the American Society of Mechanical Engineers, the Western Society of Engineers, the National Electric Light Association and the American Electric Railway Association.

W. D. HODGSON has recently been made district manager of the Imperial Electric Co. of Akron, Ohio, with headquarters in Chicago. Mr. Hodgson has had an extended experience in the electrical industry, previous to his connection with the Imperial company having been superintendent of the lighting and power department of the Northern Ohio Light & Traction Co. at Akron.

FIRST LIEUT. S. A. KOENIG of the coast artillery has been discharged from the service and has joined the forces of the Advance Machinery & Supply Co., Denver, Colo., as sales engineer. Lieutenant Koenig was graduated from the electrical engineering department of the University of Colorado in 1913 and has spent about four years in the employ of the General Electric Co., Schenectady, N. Y. The last two years of this time was spent in the experimental department. Lieutenant Koenig joined the colors in August, 1917, and was commissioned first lieutenant C. A. R. C. in November, 1917. The Advance company is the western representative for the De Laval Steam Turbine Co., C. H. Wheeler Manufacturing Co., Uehling Instrument Co., Republic Flow Meters Co., Betson Plastic Fire Brick Co., Richardson-Phenix Co., Ohio Blower Co., Viking Pump Co., Heine Chimney Co., Yarnall-Waring Co., together with several other specialties of merit used in the engineering field.

Obituary.

DR. JAMES J. CLARK, inventor of pioneer telegraph devices, and formerly associated with Samuel Morse, Alfred Vail, and other prominent figures in telegraphic development, died at Washington, D. C., on March 21, aged 90 years.

SIR WILLIAM CROOKES, English chemist and physicist, died in London, Eng., on April 4. He was born in London on June 17, 1832, and studied chemistry at the Royal College of Chemistry under A. W. von Hofmann, whose assistant he became in 1851. Three years later he was appointed an assistant in the meteorological department of the Radcliffe observatory, Oxford, and in 1855 he obtained a chemical post at Chester. In 1861, he discovered thallium, a new element, while conducting an examination of the residue left in the manufacture of sulphuric acid, and while carrying out investigations of the metal and its properties found that it appeared heavier when cold than hot. This was explained by him as being due to a "repulsion of radiation." Utilizing this principle he constructed the radiometer, which led to his famous researches on the phenomena produced by the discharge of electricity through highly exhausted tubes, sometimes known as Crookes tubes, and to the development of his theory of "radiant matter" or matter in a "fourth state," which led up to the modern electronic theory. Later he began an inquiry into the constitutions of rare earths, his researches leading him to very startling results. On the discovery of radium, he took up the study of the element, doing much to bring its forces to the service of mankind. He was a prolific writer of books on physics and chemistry. He was knighted in 1897 and was the recipient of numerous medals and honors from various institutions.

Financial News

Public Utility Commissions a Vital Necessity.

In the March issue of the Doherty News, issued by Henry L. Doherty & Co., the following editorial comments are made concerning public utility commissions:

"One of the regrettable results of the war as it effects public utility properties throughout the United States is a disposition on the part of the people to do away with public utility commissions, or at least, to take away some of their powers of rate making. Since the organization of the commissions by the various states there has been a gradual increase in the power granted to them. This power has not always been wisely or fairly wielded. The machinery of the commissions, however, has been advantageous in one respect in particular, and that is it has been able to function in a more or less disinterested manner.

"As long as conditions were such that public utility commissions could institute reforms that improved the operating conditions of utilities under their jurisdiction, the commissions received popular approval from the people. With the increased costs resulting from the war, which included materially higher wages and higher prices for maintenance and improvements, the utilities were confronted with the problem of obtaining higher rates for their services. In many cases the necessity for these higher rates was so great that unless they were granted the companies would be forced into the hands of receivers. The public utility commissions in most cases saw the necessity also for granting the applications of the companies and gave the relief needed.

"In many instances where higher rates had been allowed the people in the cities and towns affected attempted by every means within their power to prevent the higher rates going into effect. Out of the agitation which grew up as the result of this feeling on the part of the people there has developed a movement to return to the individual cities and towns the power of making rates that has heretofore been in the hands of the commissions. This is a dangerous movement for the reason that local political conditions are often such that the utilities cannot obtain reasonable treatment from the people of the cities in which they operate. It is a movement that should be fought by every stockholder in a public utility corporation. The day when the stockholder in a corporation has no further obligation than to receive his dividend checks has passed. The stockholder's responsibility goes much further than this. He is a partner with the management of the corporation and as such he should use his influence to develop public opinion along sound lines.

"The public utility commissions may not have been the most ideal medium for regulating utility properties, but they are on the whole better than anything that has yet been devised, and they are better than the method of local control that is now being agitated in so many communities. The stockholders must fight to prevent any further demoralization of public utility control and in this manner particularly their influence is vitally necessary."

Toronto System Shows Large Increase in Gross.

The annual report of the Toronto Hydro-Electric System for the past year shows a gross revenue of $2,353,443, made up as follows: Lighting, $743,914; power, $982,859; street lighting, $300,594; exhibition, $15,748; current supply in bulk to other municipalities, $245,856; income from other sources, $64,472. The expenditures were $842,251, cost of current; $661,361, cost of operation and management; and $846,164, fixed charges, interest and sinking fund, a total of $2,231,776, showing a net profit in the year's operation of $21,666. The assets of the system are valued at $10,628,232, with gross liabilities of $10,564,253, showing a surplus of assets totaling $63,979.

Staten Island Company Issues Bonds.

The Public Service Commission for the First District has adopted an order permitting the Staten Island Rapid Transit Railway Co. to issue $1,150,000 face value of refunding bonds, due June 1, 1948, and bearing interest at 4%, payable semi-annually. The bonds are redeemable at par and accrued interest on and after June 1, 1925. The bond issue is secured under the company's $5,000,000 refunding mortgage, executed on June 1, 1905, to the Guaranty Trust Co. of New York, as trustee. The order recites that the Railway Co. shall sell the bonds so as to net it not less than the par value of the principal thereof, besides accrued interest, the proceeds to be applied for the discharge of refunding of an equal amount of obligations of the railway company to the Baltimore & Ohio Railroad Co. for the acquisition of property and the construction, completion, extension or improvement of its facilities. The application of the company under which the hearings were held states that the Staten Island Rapid Transit Railway Co. is indebted to the Baltimore & Ohio Co. in the sum of $1,625,000 for cash advances made to the Rapid Transit Railway Co. for construction purposes, much of the money being spent for dock and other improvements in the vicinity of St. George, Staten Island.

American International Corporation Issues Annual Report.

In its annual report to stockholders, the American International Corporation has clearly defined the policy and scope of its organization. It states that while the effort of the corporation during the greater part of 1918 was devoted almost entirely to war work, normal business has been resumed as far as practicable since the armistice was signed. Founded primarily for foreign business, three years' experience has shown to the organization the necessity of an association with domestic interests to enable it to develop effectively international investment and trade. Its charter provides for a very wide field of activity, permitting it to undertake almost any business that it might desire.

For the purpose of getting the best organization with a high concentration of effort upon each undertaking, it has been the policy of the management to carry on a large part of the business through subsidiary companies which confine themselves exclusively to the particular business for which they are organized. The entire business of the American International Corporation falls into five principal groups: Participations in foreign or domestic corporations doing foreign business, which includes investments in the securities of corporations whose activities are in accord with the purposes for which the corporation is formed; the second is proprietary and controlled companies, in which the corporation owns all or a majority of the capital stock. In these companies the corporation exercises its rights in the appointment of directors, officers and staff and in the direction of its general policies. Each of these sub-companies operates independently of the others and has its own organization, both domestic and foreign, responsible to its president and board of directors. This group has had considerable difficulty during the year on account of the various trade restrictions, such as export licenses, lack of shipping space and foreign taxes, but on the whole a good showing has been made.

The third group embodies development undertakings, governmental or private, at home or abroad. New undertakings of this group have been postponed during the war because of the restricted market for securities. The fourth group includes departmental business conducted directly by the corporation in its own name either in the United States or abroad. In this group are included also research, supervisory and consulting departments, which do not necessarily return a direct profit, but which form an essential part of the organization. The fifth division consists of the foreign offices and representation in foreign corporations organized jointly with interests in foreign countries for the purpose of studying business opportunities there. During the past years the foreign representatives have continued to strengthen the friendly relations of the corporation abroad, and have rendered it valuable assistance through their intimate knowledge of conditions in the countries in which they are established. The company has recently completed the organization in Italy of a Societé d'Etude. It is expected that similar arrangements may be made in other countries for the systematic study of opportunities for commerce, engineering, construction and finance.

Schenectady Illuminating Merger.

Orders have been passed by the Public Service Commission authorizing the consolidation of the Schenectady Power Co. and Mohawk Gas Co., of Schenectady, N. Y., Hudson Electric Light & Power Co. of Amsterdam, and the East Creek Electric Light & Power Co. into the Schenectady Illuminating Co. The Illuminating company owns the stock of the Mohawk Gas Co. and the Commission's orders authorize it to acquire the stock of the other three companies.

The merger of the four companies is a step in the proposed consolidation of the Schenectady Illuminating Co. and the Adirondack Power Corporation, which controls extensive hydroelectric power developments on the upper Hudson river. The consolidated balance sheet of the five companies shows total fixed capital as $8,402,192, total assets $10,505,235, total capitalization $6,277,000, total unfunded debt $2,033,442, total reserves $967,867, and corporate surplus $1,256,925. The orders authorize acquiring common stock, par value, aggregating $1,600,000, as follows: $800,000 of the Schenectady Power Co., $300,000 of the Edison company of Amsterdam, and $500,000 of the East Creek company.

Richmond Light Notes Authorized.

The Indiana Public Service Commission has granted authority to the Richmond Light, Heat & Power Co. to sell at par $450,000 of two-year 7% gold notes, with which to refund an issue of $450,000 of five-year 6% gold notes previously authorized by the Commission. The Commission required, however, that the holding company guarantee principal and interest, the order reading "it appears that rates based on the value of the company's property and fixed by the Commission, $475,000, may prove to be insufficient to meet the existing or the proposed fixed charges on the company's bonded and floating debt of $749,719." The Commission denied the company authority to issue the bonds as the company proposed in the petition, holding that the company's proposal virtually would have paid a bonus of 3% to holders of the old issue of notes for accepting a new issue in lieu thereof.

Oklahoma Company Issues Notes.

A syndicate headed by H. M. Byllesby & Co., Inc., and Bonbright & Co., Inc., reports a heavy oversubscription of the offering of $2,500,000 Oklahoma Gas & Electric Co. one year 7% gold notes. Proceeds of the notes, which are dated April 1, 1919, and offered at 99½ and interest, will be used principally for the retirement of the present issue of $2,500,000 two-year 6% notes due June 15, 1919. Net earnings for the year ended Dec. 31, 1918, were $821,404. Annual charges on bonds, notes and divisional preferred stock were $290,879, leaving a balance of $530,525, or more than three times the interest charges on the new issue of notes.

Telephone Bonds Authorized.

Authority has been granted the Independent Telephone & Telegraph Co. by the Illinois Public Utilities Commission to issue first mortgage 6% gold bonds in the amount of $13,500 and the execution of its deed of trust to the Sangamon Loan & Trust Co. or Springfield to secure the issue of bonds. O. F. Berry, president of the company, Carthage, Ill.

For the Readjustment Period—What?

XXXII.

LOOKING NORTH

Much is said nowadays of encouraging trade relations with South America, and undoubtedly the opportunities for business with the Latin countries promise excellent returns from wise cultivation.

It is, however, a fact that the Dominion of Canada, with a population one-third that of Brazil, is a better purchaser in American markets than the whole of South America.

In January of this year Canada bought from us $55,700,000 worth of goods, while all South America trailed with $52,000,000.

In seven months ending January 31, 1919, of which a little more than four fell in war time and a little less than three in the armistice period, Canada was billed by the United States for the vast sum of $542,500,000 on commodities purchased, while the whole of South America bought of us only $337,300,000 worth. In the same period our exports to all Africa amounted to only $38,000,000; to all Oceania, $123,000,000; to all Asia, $475,000,000.

The balance in our favor on trade with Canada in the seven months was more than double the balance on trade with South America.

Our Canadian neighbors are a thrifty, progressive people, closely kin to us in blood, in spirit, in habits of life. They are a good people to do business with. The friendship cemented by comradeship in war should become a close trade alliance in peace. It is to our advantage for many reasons to promote intercourse between the two countries. This is one of the factors to be taken into consideration when planning and carrying out the readjustment of our industries.

C. A. TUPPER *President*
INTERNATIONAL TRADE PRESS, INC., CHICAGO

Dividends.

The board of directors of the Northern States Power Co. has declared the regular quarterly dividend of 1¾% on the preferred stock of the company, payable April 21 to stockholders of record as of March 31.

The board of directors of the Western States Gas & Electric Co. of Delaware has declared the regular quarterly dividend of 1¾% on the preferred stock of the company, payable April 15 to stockholders of record as of March 31.

Bell Telephone Co. of Pennsylvania has declared a quarterly dividend of 1½%, payable April 15 to stock of record April 5.

Central Illinois Public Service Co., has declared a quarterly dividend of 1½% on preferred stock, payable April 15 to stock of record April 1.

The board of directors of the Westinghouse Electric & Manufacturing Co. has declared a quarterly dividend of 1¾%, payable April 30 to stockholders of record April 4; also a quarterly dividend of 1¾% on preferred stock, payable April 15 to stock of record April 4.

Ottumway Railway & Light Co. has declared a quarterly dividend of 1¾%, payable April 15 to stock of record March 31.

Western Power Co. has declared a quarterly dividend of 1% on preferred stock, payable April 15 to stock of record March 31.

Philadelphia Co. has declared a quarterly dividend of 1½% on common stock, payable April 30; a semi-annual dividend of 3% on cumulative preferred stock, payable in May, and a quarterly dividend of 1¾% on cumulative preferred stock, payable May 1.

American Light & Traction Co. has declared a quarterly dividend of 2½% on common stock and a dividend of 2½% on each 100; also a quarterly dividend of 1½% on preferred stock, payable May 1 to stock of record April 12.

Public Service Co. of Northern Illinois has declared a quarterly dividend of $1.50 on preferred stock, also a quarterly dividend of $1.75 on common stock, both payable May 1 to stockholders of record April 15.

Westinghouse Air Brake Co. has declared a quarterly dividend of $1.75 a share, payable April 30 to stock of record March 31.

Automatic Electric Co. has declared a quarterly dividend of 1%, payable April 15 to stock of record April 9.

CITIES SERVICE, CO.

	12 months ending 1919. Feb. 28,	12 months ending Feb. 28, 1918.	Month of Feb., 1919.	Month of Feb., 1918.
Gross earnings	$22,019,868.81	$19,597,248.20	$1,767,276.27	$1,849,610.70
Expenses	576,817.11	368,179.53	58,096.20	33,520.78
Net earnings	$21,443,051 70	$19,229,068.67	$1,709,180.07	$1,816,089.92
Interest on debentures	530,261.31	2,680.70	150,098.32	213.65
Net to stock	$20,912,790.39	$19,226,387.97	$1,559,081.75	$1,815,876.27
Dividends, preferred stock	4,046,539.50	3,805,599.50	340,355.00	335,592.00
Net to common stock and reserves	$16,866,250.89	$15,420,788.47	$1,218,726.75	$1,480,284.27
Debenture fund				$ 515,696.41
Contingent fund				624,521.56
Stock surplus				1,702,768.55
Surplus reserve				5,863,116.42
Surplus				29,525,445.24
Total surplus and reserves				$38,231,548.18

WEEKLY COMPARISON OF CLOSING-BID PRICES OF SECURITIES OF LEADING ELECTRICAL COMPANIES.

Quotations furnished by F. M. Zeller & Co., Rookery Bldg., Chicago.

Public Utilities.	Div. rate. Per cent.	Bid Apr. 1.	Bid Apr. 8.
Adirondack Electric Power of Glens Falls, common	6	12	12
Adirondack Electric Power of Glens Falls, preferred	6	72	72
American Gas & Electric of New York, common	10+extra	119	119
American Gas & Electric of New York, preferred	6	41	41
American Light & Traction of New York, common	..	239	240
American Light & Traction of New York, preferred	6	98½	99
American Power & Light of New York, common	4	54	54
American Power & Light of New York, preferred	6	73	74
American Public Utilities of Grand Rapids, common	..	..	10
American Public Utilities of Grand Rapids, preferred	7	33	30
American Telephone & Telegraph of New York	..	103½	104¾
American Water Works & Elec. of New York, common	..	5½	5
American Water Works & Elec. of New York, particip	7	10	10
American Water Works & Elec. of New York, first preferred	..	62	62
Appalachian Power, common	..	2	2
Appalachian Power, preferred	7	12	12
Cities Service of New York, common	+extra	359	358
Cities Service of New York, preferred	6	79	79¼
Commonwealth Edison of Chicago	8	113	114
Comm. Power, Railway & Light of Jackson, common	..	20	23
Comm. Power, Railway & Light of Jackson, preferred	6	43	44½
Federal Light & Traction of New York, common	..	9	9
Federal Light & Traction of New York, preferred	..	45	44
Illinois Northern Utilities of Dixon	6	..	..
Middle West Utilities of Chicago, common	2+extra	23	25
Middle West Utilities of Chicago, preferred	6	48	51
Northern States Power of Chicago, common	..	70	70
Northern States Power of Chicago, preferred	ex.div.7	89	89
Pacific Gas & Electric of San Francisco, common	..	52½	52
Pacific Gas & Electric of San Francisco, preferred	6	87	87
Public Service of Northern Illinois, Chicago, common	7	93	95
Public Service of Northern Illinois, Chicago, preferred	6	91	90
Republic Railway & Light of Youngstown, common	4	20	20
Republic Railway & Light of Youngstown, preferred	6	58	59
Standard Gas & Electric of Chicago, common	..	29½	28
Standard Gas & Electric of Chicago, preferred	6	43	42
Tennessee Railway, Light & Power of Chattanooga, common	..	4½	5
Tennessee Railway, Light & Power of Chattanooga, preferred	6	21	22
United Light & Railways of Grand Rapids, common	4	39	40½
United Light & Railways of Grand Rapids, preferred	6	71	71½
Western Power of San Francisco, common	..	17	16½
Western Union Telegraph of New York	extra	85	87
Industries—			
Electric Storage of Philadelphia, common	4	70	69
General Electric of Schenectady	8	155½	156
Westinghouse Electric & Mfg. of Pittsburgh, common	7	45¾	45½
Westinghouse Electric & Mfg. of Pittsburgh, preferred	7	55	55

Earnings.

SOUTHERN CALIFORNIA EDISON.

	1919.	1918.
February gross	$ 714,256	$ 643,458
Net after taxes	451,195	383,876
Surplus after charges	181,628	151,008
12 months gross	8,943,407	8,168,531
Net after taxes	5,586,934	5,259,223
Surplus after charges	2,592,597	2,736,124

THIRD AVENUE RAILWAY.

	1919.	1918.
For February—		
Gross	$ 764,757	$ 693,966
Net after taxes	107,258	89,871
Deficit after charges.	104,018	117,673
For the 8 months ended Feb. 28—		
Gross	6,586,223	6,832,414
Net after taxes	1,037,829	1,380,600
Deficit after charges.	626,589	290,463

COMMONWEALTH POWER, RAILWAY & LIGHT.

The Commonwealth Power, Railway & Light Co. reports for February, 1919, gross earnings of $2,036,429, an increase of 25.77% compared with the corresponding period of a year ago. Net earnings amounted to $855,515, an increase of 50.07%, and surplus after charges of $180,912, compared with a deficit of $14,144 for the month of February, 1918.

NORTHERN OHIO ELECTRIC CORP.

February, 1919—	
Gross earnings	$673,934
Net earnings	223,127
Surplus after charges	60,824

CANADIAN WESTINGHOUSE.

The Canadian Westinghouse Electric & Manufacturing Co., Ltd., in its annual report for the year ending Dec. 31, 1918, shows net earnings after depreciation of $870,718, or 13.98% increase, as compared with $846,276 in 1917. During the year quarterly dividends were paid at the rate of 7% and an extra dividend of 2% paid. The total assets are $9,441,398, an increase over 1917 of $286,288.

CENTRAL MISSISSIPPI VALLEY ELECTRIC PROPERTIES.

January—	
Gross earnings	$35,248
Surplus after charges	7,688
12 months—	
Gross earnings	346,278
Surplus after charges	49,409

PENNSYLVANIA UTILITIES.

	1919.	1918.
Jan., operating income	$ 50,024	$ 26,344
12 months	411,928	197,055

EL PASO ELECTRIC.

Gross earnings—	1919.	1918.
February	$ 120,067	$ 103,875
12 months	1,287,428	1,274,165
Net earnings—		
February	34,327	37,400
12 months	382,206	460,347

FEDERAL LIGHT & TRACTION.

Gross earnings—	1919.	1918.
January	$ 333,629	$ 310,344
12 months	3,520,516	2,933,776
Net earnings—		
January	97,756	98,341
12 months	1,051,724	861,573

BLACKSTONE VALLEY GAS & ELEC.

Gross earnings—	1919.	1918.
February	$ 198,565	$ 170,418
12 months	2,521,369	2,013,346
Net earnings—		
February	43,047	50,938
12 months	680,006	624,664

SAN JOAQUIN LIGHT & POWER.

Gross earnings—	1919.	1918.
12 months	$2,615,548	$2,054,000
Net earnings—		
12 months	1,122,933	1,158,365

DENVER GAS & ELECTRIC LIGHT.

The annual report of the Denver Gas & Electric Co. for the year ending Dec. 31, 1918, and comparisons with 1917, follow:

	1918.	1917.
Gross earnings	$3,727,259.49	$3,419,966.23
Operating exp.	2,265,392.25	1,992,335.51
Less underlying bond interest	$ 372,065.42	375,509.59
Balance	$1,089,801.82	$1,051,821.13